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# THE GENESIS OF SPECIES.

## CHAPTER I.

### INTRODUCTORY.

The problem of the genesis of species stated.—Nature of its probable solution.—Importance of the question.—Position here defended.—Statement of the DARWINIAN THEORY.—Its applicability to details of geographical distribution; to rudimentary structures; to homology; to mimicry, &c.—Consequent utility of the theory.—Its wide acceptance.—Reasons for this, other than, and in addition to, its scientific value.—Its simplicity.—Its bearing on religious questions.—*Odium theologicum* and *odium antitheologicum*.—The antagonism supposed by many to exist between it and theology neither necessary nor universal.—Christian authorities in favour of evolution.—Mr. Darwin's "Animals and Plants under Domestication."—Difficulties of the Darwinian theory enumerated.

THE great problem which has so long exercised the minds of naturalists, namely, that concerning the origin of different kinds of animals and plants, seems at last to be fairly on the road to receive—perhaps at no very distant future—as satisfactory a solution as it can well have.

But the problem presents peculiar difficulties. The birth of a "species" has often been compared with that of an "individual." The origin, however, of even an individual animal or plant (that which determines an embryo to evolve itself,—as,

*e.g.*, a spider rather than a beetle, a rose-plant rather than a pear) is shrouded in obscurity. *A fortiori* must this be the case with the origin of a "species."

Moreover, the analogy between a "species" and an "individual" is a very incomplete one. The word "individual" denotes a concrete whole with a real, separate, and distinct existence. The word "species," on the other hand, denotes a peculiar congeries of characters, innate powers and qualities, and a certain nature realized indeed in individuals, but having no separate existence, except ideally as a thought in some mind.

Thus the birth of a "species" can only be compared metaphorically, and very imperfectly, with that of an "individual."

Individuals *as individuals*, actually and directly produce and bring forth other individuals; but no "congeries of characters" no "common nature" *as such*, can directly bring forth another "common nature," because, *per se*, it has no existence (other than ideal) apart from the individuals in which it is manifested.

The problem then is, "by what combination of natural laws does a new 'common nature' appear upon the scene of realized existence?" *i.e.* how is an individual embodying such new characters produced?

For the approximation we have of late made towards the solution of this problem, we are mainly indebted to the invaluable labours and active brains of Charles Darwin and Alfred Wallace.

Nevertheless, important as has been the impulse and direction given by those writers to both our observations and speculations, the solution will not (if the views here advocated are correct) ultimately present that aspect and character with which it has issued from the hands of those writers.

Neither, most certainly, will that solution agree in appearance or substance with the more or less crude conceptions which have been put forth by most of the opponents of Messrs. Darwin and Wallace.

Rather, judging from the more recent manifestations of thought on opposite sides, we may expect the development of some *tertium quid*—the resultant of forces coming from different quarters, and not coinciding in direction with any one of them.

As error is almost always partial truth, and so consists in the exaggeration or distortion of one verity by the suppression of another which qualifies and modifies the former, we may hope, by the synthesis of the truths contended for by various advocates, to arrive at the one conciliating reality.

Signs of this conciliation are not wanting: opposite scientific views, opposite philosophical conceptions, and opposite religious beliefs, are rapidly tending by their vigorous conflict to evolve such a systematic and comprehensive view of the genesis of species as will completely harmonize with the teachings of science, philosophy, and religion.

To endeavour to add one stone to this temple of concord, to try and remove a few of the misconceptions and mutual misunderstandings which oppose harmonious action, is the aim and endeavour of the present work. This aim it is hoped to attain, not by shirking difficulties, but analysing them, and by endeavouring to dig down to the common root which supports and unites diverging stems of truth.

It cannot but be a gain when the labourers in the three fields above mentioned, namely, science, philosophy, and religion, shall fully recognize this harmony. Then the energy too often spent in futile controversy, or withheld through prejudice, may be profitably and reciprocally exercised for the mutual benefit of all.

Remarkable is the rapidity with which an interest in the question of specific origination has spread. But a few years ago it scarcely occupied the minds of any but naturalists. Then the crude theory put forth by Lamarck, and by his English interpreter the author of the “*Vestiges of Creation*,” had rather discredited than helped on a belief in organic evolution—a belief,

that is, in new kinds being produced from older ones by the ordinary and constant operation of natural laws. Now, however, this belief is widely diffused. Indeed, there are few drawing-rooms where it is not the subject of occasional discussion, and artisans and schoolboys have their views as to the permanence of organic forms. Moreover, the reception of this doctrine tends actually, though by no means necessarily, to be accompanied by certain beliefs with regard to quite distinct and very momentous subject-matter. So that the question of the "Genesis of Species" is not only one of great interest, but also of much importance.

But though the calm and thorough consideration of this matter is at the present moment exceedingly desirable, yet the actual importance of the question itself as to its consequences in the domain of theology has been strangely exaggerated by many, both of its opponents and supporters. This is especially the case with that form of the evolution theory which is associated with the name of Mr. Darwin; and yet neither the refutation nor the demonstration of that doctrine would be necessarily accompanied by the results which are hoped for by one party and dreaded by another.

The general theory of evolution has indeed for some time past steadily gained ground, and it may be safely predicted that the number of facts which can be brought forward in its support will, in a few years, be vastly augmented. But the prevalence of this theory need alarm no one, for it is, without any doubt, perfectly consistent with strictest and most orthodox Christian theology. Moreover, it is not altogether without obscurities, and cannot yet be considered as fully demonstrated.

The special Darwinian hypothesis, however, is beset with certain scientific difficulties, which must by no means be ignored, and some of which, I venture to think, are absolutely insuperable. What Darwinism or "Natural Selection" is, will

be shortly explained ; but before doing so, I think it well to state the object of this book, and the view taken up and defended in it. It is its object to maintain the position that "Natural Selection" acts, and indeed must act, but that still, in order that we may be able to account for the production of known kinds of animals and plants, it requires to be supplemented by the action of some other natural law or laws as yet undiscovered.<sup>1</sup> Also, that the consequences which have been drawn from Evolution, whether exclusively Darwinian or not, to the prejudice of religion, by no means follow from it, and are in fact illegitimate.

The Darwinian theory of "Natural Selection" may be shortly stated thus :<sup>2</sup>—

Every kind of animal and plant tends to increase in numbers in a geometrical progression.

Every kind of animal and plant transmits a general likeness, with individual differences, to its offspring.

Every individual may present minute variations of any kind and in any direction.

Past time has been practically infinite.

Every individual has to endure a very severe struggle for existence, owing to the tendency to geometrical increase of all kinds of animals and plants, while the total animal and vegetable population (man and his agency excepted) remains almost stationary.

Thus, every variation of a kind tending to save the life of the individual possessing it, or to enable it more surely to propagate its kind, will in the long run be preserved, and will transmit its favourable peculiarity to some of its offspring,

<sup>1</sup> In the last edition of the "Origin of Species" (1869) Mr. Darwin himself admits that "Natural Selection" has not been the exclusive means of modification, though he still contends it has been the most important one.

<sup>2</sup> See Mr. Wallace's recent work, entitled "Contributions to the Theory of Natural Selection," where, at p. 302, it is very well and shortly stated.

which peculiarity will thus become intensified till it reaches the maximum degree of utility. On the other hand, individuals presenting unfavourable peculiarities will be ruthlessly destroyed. The action of this law of Natural Selection may thus be well represented by the convenient expression "survival of the fittest."<sup>1</sup>

Now this conception of Mr. Darwin's is perhaps the most interesting theory, in relation to natural science, which has been promulgated during the present century. Remarkable, indeed, is the way in which it groups together such a vast and varied series of biological<sup>2</sup> facts, and even paradoxes, which it appears more or less clearly to explain, as the following instances will show. By this theory of "Natural Selection," light is thrown on the more singular facts relating to the geographical distribution of animals and plants; for example, on the resemblance between the past and present inhabitants of different parts of the earth's surface. Thus in Australia remains have been found of creatures closely allied to kangaroos and other kinds of pouched beasts, which in the present day exist nowhere but in the Australian region. Similarly in South America, and nowhere else, are found sloths and armadillos, and in that same part of the world have been discovered bones of animals different indeed from existing sloths and armadillos, but yet much more nearly related to them than to any other kinds whatever. Such coincidences between the existing and antecedent geographical distribution of forms are numerous. Again, "Natural Selection" serves to explain the circumstance that often in adjacent islands we find animals closely resembling, and appearing to represent, each other; while if certain of these islands show signs (by depth of surrounding sea or what not) of more ancient separation, the

<sup>1</sup> "Natural Selection" is happily so termed by Mr. Herbert Spencer in his "Principles of Biology."

<sup>2</sup> Biology is the science of life. It contains zoology, or the science of animals, and botany, or that of plants.

animals inhabiting them exhibit a corresponding divergence.<sup>1</sup> The explanation consists in representing the forms inhabiting the islands as being the modified descendants of a common stock, the modification being greatest where the separation has been the most prolonged.

“Rudimentary structures” also receive an explanation by means of this theory. These structures are parts which are apparently functionless and useless where they occur, but which represent similar parts of large size and functional importance in other animals. Examples of such “rudimentary structures” are the foetal teeth of whales, and of the front part of the jaw of ruminating quadrupeds. These foetal structures are minute in size, and never cut the gum, but are reabsorbed without ever coming into use, while no other teeth succeed them or represent them in the adult condition of those animals. The mammary glands of all male beasts constitute another example, as also does the wing of the apteryx—a New Zealand bird utterly incapable of flight, and with the wing in a quite rudimentary condition (whence the name of the animal). Yet this rudimentary wing contains bones which are miniature representatives of the ordinary wing-bones of birds of flight. Now, the presence of these useless bones and teeth is explained if they may be considered as actually being the inherited diminished representatives of parts of large size and functional importance in the remote ancestors of these various animals.

Again, the singular facts of “homology” are capable of a similar explanation. “Homology” is the name applied to the investigation of those profound resemblances which have so often been found to underlie superficial differences between animals of very different form and habit. Thus man, the horse, the whale, and the bat, all have the pectoral limb, whether it be the arm, or fore-leg, or paddle, or wing, formed on essentially the same type, though

<sup>1</sup> For very interesting examples, see Mr. Wallace’s “Malay Archipelago.”

the number and proportion of parts may more or less differ. Again, the butterfly and the shrimp, different as they are in appearance and mode of life, are yet constructed on the same common plan, of which they constitute diverging manifestations. No *a priori* reason is conceivable why such similarities should be necessary, but they are readily explicable on the assumption of a genetic relationship and affinity between the animals in question, assuming, that is, that they are the modified descendants of some ancient form—their common ancestor.

That remarkable series of changes which animals undergo before they attain their adult condition, which is called their process of development, and during which they more or less closely resemble other animals during the early stages of the same process, has also great light thrown on it from the same source. The question as to the singularly complex resemblances borne by every adult animal and plant to a certain number of other animals and plants—resemblances by means of which the adopted zoological and botanical systems of classification have been possible—finds its solution in a similar manner, classification becoming the expression of a genealogical relationship. Finally, by this theory—and as yet by this alone—can any explanation be given of that extraordinary phenomenon which is metaphorically termed *mimicry*. Mimicry is a close and striking, yet superficial resemblance borne by some animal or plant to some other, perhaps very different, animal or plant. The “walking leaf” (an insect belonging to the grasshopper and cricket order) is a well-known and conspicuous instance of the assumption by an animal of the appearance of a vegetable structure (see illustration on p. 35); and the bee, fly, and spider orchids are familiar examples of a converse resemblance. Birds, butterflies, reptiles, and even fish, seem to bear in certain instances a similarly striking resemblance to other birds, butterflies, reptiles, and fish, of altogether distinct kinds. The explanation of this matter which “Natural Selection” offers



to animals, is that certain varieties of one kind have found exemption from persecution in consequence of an accidental resemblance which such varieties have exhibited to animals of another kind, or to plants; and that they were thus preserved, and the degree of resemblance was continually augmented in their descendants. As to plants, the explanation offered by this theory might perhaps be that varieties of plants which presented a certain superficial resemblance in their flowers to insects, have thereby been helped to propagate their kind, the visit of certain insects being useful or indispensable to the fertilization of many flowers.

We have thus a whole series of important facts which "Natural Selection" helps us to understand and co-ordinate. And not only are all these diverse facts strung together, as it were, by the theory in question; not only does it explain the development of the complex instincts of the beaver, the cuckoo, the bee, and the ant, as also the dazzling brilliancy of the humming-bird, the glowing tail and neck of the peacock, and the melody of the nightingale; the perfume of the rose and the violet, the brilliancy of the tulip and the sweetness of the nectar of flowers; not only does it help us to understand all these, but serves as a basis of future research and of inference from the known to the unknown, and it guides the investigator to the discovery of new facts which, when ascertained, it seems also able to co-ordinate.<sup>1</sup> Nay, "Natural Selection" seems capable of application not only to the building up of the smallest and most insignificant organisms, but even of extension beyond the biological domain altogether, so as possibly to have relation to

<sup>1</sup> See Müller's work, "Für Darwin," lately translated into English by Mr. Dallas. Mr. Wallace also predicts the discovery, in Madagascar, of a hawk-moth with an enormously long proboscis, and he does this on account of the discovery there of an orchid with a nectary from ten to fourteen inches in length. See *Quarterly Journal of Science*, October 1867, and "Natural Selection," p. 275.

the stable equilibrium of the solar system itself, and even of the whole sidereal universe. Thus, whether this theory be true or false, all lovers of natural science should acknowledge a deep debt of gratitude to Messrs. Darwin and Wallace, on account of its practical utility. But the utility of a theory by no means implies its truth. What do we not owe, for example, to the labours of the Alchemists? The emission theory of light, again, has been pregnant with valuable results, as still is the Atomic theory, and others which will readily suggest themselves.

With regard to Mr. Darwin (with whose name, on account of the noble self-abnegation of Mr. Wallace, the theory is in general exclusively associated), his friends may heartily congratulate him on the fact that he is one of the few exceptions to the rule respecting the non-appreciation of a prophet in his own country. It would be difficult to name another living labourer in the field of physical science who has excited an interest so widespread, and given rise to so much praise, gathering round him, as he has done, a chorus of more or less completely acquiescing disciples, themselves masters in science, and each the representative of a crowd of enthusiastic followers.

Such is the Darwinian theory of "Natural Selection," such are the more remarkable facts which it is potent to explain, and such is the reception it has met with in the world. A few words now as to the reasons for the very widespread interest it has awakened, and the keenness with which the theory has been both advocated and combated.

The important bearing it has on such an extensive range of scientific facts, its utility, and the vast knowledge and great ingenuity of its promulgator, are enough to account for the heartiness of its reception by those learned in natural history. But quite other causes have concurred to produce the general and higher degree of interest felt in the theory beside the readiness with which it harmonizes with biological facts. These latter could only be appreciated by physiologists, zoologists, and botanists; whereas