I now approach the *magnum opus*. It may be said that the quartett of books dealing with Evolution constitute as a whole the great work. First in point of time and therefore foremost for our consideration, comes the Origin of Species. This states the theory of Natural Selection clearly, and gives the reasoning upon which the acceptance thereof is based. The second volume, Animals and Plants under Domestication, gives the mass of facts upon which the reasoning is based. Then comes the Descent of Man wherein the part of Evolution of greatest interest to man is discussed, and finally the Expression of the Emotions. In this the points wherein man is supposed to differ most essentially from his fellows are studied without any shaking of the general conclusion.

A.—Origin of Species.

CHAPTER XXXV.

(1.) *The Meaning of Species.* (2.) *Historical Review.*

(1) THE WORD "SPECIES." My first endeavor will be to make plain the meaning of the word "species." It is a term, at one time much more convenient than at present, employed in the classification of plants and of animals. The most casual observer of either of the two great kingdoms of living beings, notices in the mechanical way that is the observation of many, that there are varying degrees of resemblance between organised beings. He sees that certain plants or animals closely resemble though they are not identical with each other, whilst certain other plants or animals are widely different from the former groups. He speedily thinks out and uses a rough kind of classification. The biologist recognises in living things two great kingdoms—the Animal and the Vegetable. He recognises in each kingdom strongly marked groups, which he names sub-kingdoms. Thus, among animals he sees a large number possessing back-bones, and he constitutes them the sub-kingdom Vertebrata. Studying this sub-kingdom he notices that there are groups therein strongly marked off one from the other, but not so strongly as were the sub-kingdoms. These he calls classes. Thus, finding a number of creatures who suckle their young, he constitutes them the class Mammalia. Investigating this class, he observes yet smaller groups, and to these he gives the name of orders. To one of these groups he applies the title Carnivora. The orders are divisible into genera. The order named, for example, contains such genera as Canis, Felis, Leo, Ursus—the dog, the cat, the lion, the bear. But of genera there are divisions. Thus, of the dog kind are many sorts. There are the dog (*Canis familiaris*), the wolf

(*Canis lupus*), the jackal (*Canis aureus*). These are species of the genus Canis. Species frequently present varieties. Of the species *Canis familiaris*, there are several forms. Greyhounds, bloodhounds, spaniels, terriers, collies, are all varieties of the species. It is no definition of a species, however, to say a species is a division of a genus and contains varieties, and yet that is all I have done so far. Is a definition of a species more accurate than this possible? Some years ago the answer would have been ready enough. In the books of a few years back, unfortunately perhaps in not a few of the present day, there are elaborate definitions of the word. Perhaps the most typical one as representing the old habit of thought on the subject is that which settles a species to be a group of living beings that have descended from one pair of progenitors. It is hardly necessary to point out that this definition springs from the evil habit of expecting scientific accuracy in books written by unscientific persons. As long as our ideas of natural science were derived from or even colored by the mythologies of past ages, so long nothing accurate could be hoped for; as long as geologists clung to the "six days" theory, little progress could be expected; as long as biologists took the account of the origin of animals given in the works of old world thinkers as satisfactory, little progress was possible in their branch of study. But of late the light of common sense, of reason, has been brought to bear on these works; so remarkable, considering the time wherein they were written, that many have fallen into the error, as it seems to me, of regarding them as applying *verbatim et literatim* to all times. As, however, the application of the writings of the Jewish nation to the life of the present day has been seen to be unwise, as the code of morality for the most part taught therein has been found quite insufficient for later times—as even the beautiful religion taught in the New Testament, and displacing the barbaric religion of the Old, has in its turn to yield to a yet more beautiful philosophy, so has the application of the writings of the Jewish nation to natural science been seen to be unwise, so has the knowledge of natural phænomena taught therein been found, naturally enough, quite insufficient in later times, so have the scientific theories propounded in the Bible to yield to a more beautiful, because more true, philosophy.

The old idea of species was founded upon the statements of the Christian mythology. Everyone believed that each species of animal, each species of plant, was the result of a distinct creation; that the unknowable so far became knowable as to say, "Let there be canis; let there be vulpes; let there be rosa; let there be rubus." There are still many people who cleave to this along with other kindred antique notions, and of these people some few are men of recognised standing in the scientific world. Hence have arisen two schools of thought as to the origin of species—the one holding the theory of special creation, the other that the multitudinous species of living beings have been evolved from a few primordial forms, perhaps from one primordial form. This latter view is that of the evolutionists. A well marked variety may therefore be called an incipient species. From these remarks it will be seen that I look at the term "species" as one arbitrarily given, for the sake of convenience, to a set of individuals closely resembling each other, and that it does not essentially differ from the term "variety," which is given to less distinct and more fluctuating forms. The term "variety," again, in comparison with mere individual differences, is also applied arbitrarily, for convenience sake.

(2.) Historical review. In this work are first clearly enunciated reasons for the notion that species of animals and of plants are not the result of special creation, but that the multitudes now inhabiting the earth have been evolved under certain natural laws from a small number of primordial forms. It should be distinctly understood that Charles Darwin is not the first to suggest that the Old Testament account is unsatisfactory. Other writers ere his time had done that, but he was the first who grappled with the difficulties attending this view of the evolution of the many from the few. He was the first who attempted to explain—the first to lay down the definite principles that seemed to him to have governed this same evolution. Mankind is not content with the bare statement that "new species have been produced by descent with modification from those separately created." Mankind wants to know the how and the why.

Turning to Darwin's own work on the "Origin of Species," we find, even in the writings of Aristotle, most modern of ancients, the theory of Natural Selection suggested.

Between 1801 and 1815 Lamarck upheld the doctrine that all species, even to man, were the descendants of other species, but he believed that the simpler forms of living beings in existence at the present day were spontaneously generated. There are epidemics of thought. The Elizabethan age, rich in its dramatists; the eighteenth century, with its essayists and historians; the present day, with its scientific writers, are cases in point. Noticeable in this connexion is the fact that in the years 1794 and 1795 three of the greatest thinkers of Europe, denizens of different countries, were all broaching the same idea. Geoffroy St. Hilaire, Goethe, Erasmus Darwin (grandfather of our Darwin) were simultaneously, in France, in Germany, in England, hinting at the probability of the origin of higher forms of living being from the lower.

Eighteen years later Dr. Wells, the first who saw the truth and therefore the simplicity of the formation of dew, was also the first of the moderns to actually recognise the principle of Natural Selection; but he applied that principle to man alone. In 1822, and again in 1837, the Dean of Manchester dares to state that species are only higher and more lasting forms of varieties, whilst Professor Grant, who lived far enough into this century to give the present writer his first lesson in Comparative Anatomy, utters his belief that species are descended from other species, and improve in their descent. Von Buch and Rafinesque in 1836, and Haldeman, of America, seven years later, show that the new theory, as yet shaped into little definite form, was spreading to countries outside England. Finally, the authors of the remarkable "Vestiges of Creation," Owen, the younger St. Hilaire, Herbert Spencer, Naudin, Baden Powell, Von Baer, Huxley, Hooker, are some of the most distinguished among those who have stated their belief in or the probability of the truth of the descent of species from species without Special Creation. But not one of these great thinkers ever did much more than state his belief that this explanation of the origin of species was more probable than the mythological one. It was reserved for Charles Darwin, not only once more and in more clear and less mistakeable language to give voice to the new idea, but to support it with arguments of such a nature that the main body of the scientific world has yielded to them as unanswerable. It was his fortunate

lot to reply to the longing question of all men—How has this come to pass?

And in this place, ere the discussion of his great work is undertaken, it were well to remind my readers that there was with this man no hurry, no rushing at conclusions. In 1837, returning from his historic voyage round the world in the "Beagle," he has an idea that something may be thought out on this momentous subject, the origin of species. Therefore, after his patient, methodical fashion, he accumulates facts for five years. During two more years after that he notes and thinks. In 1844 he sketches only the conclusions that seem probable. Fifteen years later he publishes an abstract of his views, because there is dread that the Destroyer may interpose and smite him dead ere he has spoken his great message to the world, ere the voice that is to reverberate through the centuries to come is to have utterance. In 1859, with ill-health heavy upon him, he sees it needful to publish the conclusions he has reached without all the facts that have guided him to those conclusions. The "Origin of Species" startles the world, and that world is for ever thankful that the life of its distinguished author has lasted even long beyond the time when he was able to publish, in the "Animals and Plants under Domestication," the series of observations that had conducted him to, and had firmly and incontrovertibly established the conclusions enunciated in the former work.