

rally forced to go back to recover the habitual train of thought. So P. Huber found it was with a caterpillar, which makes a very complicated hammock; for, if he took a caterpillar which had completed its hammock up to, say, the sixth stage of construction, and put it into a hammock completed only up to the third stage, the caterpillar simply reperformed the fourth, fifth, and sixth stages of construction. If, however, a caterpillar were taken out of a hammock made up, for instance, to the third stage, and were put into one finished up to the sixth stage, so that much of its work was already done for it, far from feeling the benefit of this, it was much embarrassed, and, in order to complete its hammock, seemed forced to start from the third stage, where it had left off, and thus tried to complete the already finished work."

With a few sentences from the author's "Conclusion" we will also conclude this notice, trusting that our readers will be induced to make a larger acquaintance with the good things of the volume itself:—

"Authors of the highest eminence seem to be fully satisfied with the view that each species has been independently created. To my mind it accords better with what we know of the laws impressed on matter by the Creator that the production and selection of the past and present inhabitants of the world should have been due to secondary causes, like those determining the birth and death. When I view all beings not as special creation, but as the lineal descendants of some few beings which lived long before the first bed of the Silurian system was deposited, they seem to me to become ennobled.

"There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms, or into one; and that while the planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved."

APRIL 18, 1868.]

THE FIELD,

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DARWIN ON VARIATION.

The Variation of Animals and Plants under Domestication. By CHARLES DARWIN. London: John Murray. 2 vols., 8vo. 1868.

THE SUBJECT OF VARIATION in domesticated animals is one which has, at least until a comparatively recent period, been passed over by scientific naturalists. This neglect may have arisen from one or both of two causes—ignorance of the subject, or want of appreciation of the importance of those modifications of specific forms which are perpetuated by breeders and fanciers. Mr Charles Darwin, the author of the well-known treatise "On the Origin of Species by Natural Selection," has for very many years paid great attention to this matter, as he considers the establishment of varieties by the process of long-continued artificial or human selection to be analogous to the origin of species by natural selection; and in the volumes under notice he has given us a most complete account of the amount and nature of the changes which animals and plants have undergone whilst under man's dominion. Setting aside altogether the bearing of this work on Mr Darwin's well-known hypothesis, it possesses for naturalists the highest possible interest, as being not merely the most complete, but we may say the only work which has ever been published, in which the nature and origin of varieties or distinct breeds are scientifically treated. Nor is the value of this work lessened by its being written with reference to a particular theory. Mr Darwin is known not only as one of the most accurate observers amongst living naturalists, but also as one of the most conscientious recorders of facts, stating with equal fulness and impartiality those that are opposed to, and those that are in favour of, his own conclusions. From the peculiar nature of his speculations, Mr Darwin has had many opponents; but, however much any of these may have dissented from his conclusions, all have borne testimony to the accuracy of his statement of facts, and to the great benefits he has conferred on natural science by the singular originality of his observations.

To the breeders of domesticated animals this new work of Mr Darwin possesses the highest value, inasmuch as it is an exposition of the principles on which the improvement of breeds must be founded. We propose, therefore, to give a somewhat detailed account of the most important facts brought forward by the author, who has in this work embraced the whole subject of variation under domestication, in the hope of throwing some light on its cause, and on the laws which govern it. He treats at length of the phenomena of inheritance, of the effects of crossing different breeds, and on the sterility arising from very close interbreeding. In the course of the investigation he enters fully into the inquiry of the extent of man's influence on variability, showing that he cannot cause or prevent it, and that it is only by the selection of variations and their accumulation that he is enabled to produce important results, obtaining from the same wild original such very different varieties as the dray horse and the Shetland pony, and from another the huge cochon fowl and the diminutive bantam.

In the first volume Mr Darwin treats of the variation in the different species of domestic animals, such as dogs and cats, horses and asses, cattle, sheep, rabbits, fowls, pigeons, &c., and also that which is shown in cultivated plants. The second is devoted to inheritance, causes of variability, and laws of variation, with a chapter on a provisional hypothesis, which the author has put forward in explanation of the phenomena.

In commencing the chapter on domestic dogs and cats, the author states:

The first and chief point of interest in this chapter is, whether the numerous domesticated varieties of the dog have descended from a single wild species, or from several. Some authors believe that all have descended from the wolf, or from the jackal, or from an unknown and extinct species. Others again believe, and this of late has been the favourite tenet, that they have descended from several species, extinct and recent, more or less commingled together. We shall probably never be able to ascertain their origin with certainty.

Mr Darwin, however, inclines strongly to the belief in the mixed origin of domestic breeds, not only from a consideration of their improved by breeds as diverse as greyhounds and mastiffs, but also from the fact that they are mentioned on Assyrian monuments erected at dates 3000 years before the Christian era, but also from the various races of dogs kept by savages in all parts of the world, which always more or less closely resemble the indigenous to the country. Thus, the North American Indians are so like that they can be taken for the more northern Esquimaux dogs of the Arctic circle, while in British Guiana the dogs with a crab-eating wolf (*C. cancri-*). The power of barking possessed by dogs is obviously only an acquired habit, and, in all countries, animals are allowed to become feral.

On the island of Juan Fernandez having become feral, there is reason to believe that the dumb-bell dogs, after three years. On the other hand, dogs which have slowly reacquired the habit of barking. The *Canis latrans* type, when brought to England, is very rarely; but one born in the Zoological Gardens, London, as any other dog of the same age and size." Nilsson, a wolf-whelp, reared by a bitch, barks, exhibited a jackal which barked with the same tone as a dog. An interesting account has been given by Mr G. S. on a wild on Juan de Nova, in the Indian Ocean: "They have a faculty of barking; they had no inclination for the dogs; nor did they acquire their voice" during a captivity. On the island they "congregate in vast packs, and catch such address as foxes could display."

The objection is sometimes made to the theory that our domesticated dogs cannot be descended from wolves and jackals, because their period of gestation is different, is shown to be without foundation, as the period is found to agree in the wolf, dog, and jackal, being often, however, variable in all three. Having reviewed the subject of the origin of the dog with great care, Mr Darwin concludes as follows:

When we reflect on the extreme antiquity of the different breeds, and especially when we reflect on the close similarity both in external structure and habits between the domestic dogs of various countries and the wild species still inhabiting these same countries, the balance of evidence is strongly in favour of the multiple origin of our dogs.

The mode in which the different breeds of dogs have been established is fully entered into. With regard to man's power in selection it is stated:

Nature having given variability, man, if he so choose, could fix five toes to the hinder feet of certain breeds of dogs, as certainly as to the feet of his Dorking fowls; he could probably fix, but with much more difficulty, an additional pair of molar teeth in either jaw, in the same way as he has given additional horns to certain breeds of sheep; if he wished to produce a toothless breed of dogs, having the so-called Turkish dog, with its imperfect teeth, to work on, he could probably do so, for he has succeeded in making hornless breeds of cattle and sheep.

The deterioration of certain races of dogs in India is a matter of great importance to sportsmen, and Mr Darwin brings some new facts to bear upon the question. He says:

Dr Falconer informs me that bulldogs, which have been known, when first brought into the country, to pin down even an elephant by its trunk, not only fall off after two or three generations in pluck and ferocity, but lose the under-hung character of their lower jaws; their muzzles become finer, and their bodies lighter. English dogs imported into India are so valuable that probably due care has been taken to prevent their crossing with native dogs; so that the deterioration cannot be thus accounted for. The Rev. R. Everest informs me that he obtained a pair of setters, born in India, which perfectly resembled their Scotch parents; he raised several litters from them in Delhi, taking the most stringent precautions to prevent a cross, but he never succeeded, though this was only the second generation in India, in obtaining a single young dog like its parent in size or make; their nostrils were more contracted, their noses more pointed, their size inferior, and their limbs more slender. This remarkable tendency to rapid deterioration in European dogs subjected to the climate of India, may perhaps partly be accounted for by the tendency to reversion to a primordial condition which many animals exhibit, as we shall see in a future chapter, when exposed to new conditions of life.

The manner in which man unconsciously has produced certain variations in animals is remarkably instanced by a consideration of the variable extent to which webbing of the feet exists in dogs, being much greater in Newfoundland and otter-hounds than in terriers and the more terrestrial breeds. Mr Darwin states:

As aquatic animals which belong to quite different orders have webbed feet, there can be no doubt that this structure would be serviceable to dogs that frequent the water. We may confidently infer that no man ever selected his water dogs by the extent to which the skin was developed between their toes; but what he does is to preserve and breed from those individuals which hunt best in the water, or best retrieve wounded game, and thus he unconsciously selects dogs with feet slightly better webbed. Man thus closely imitates Natural Selection. We have an excellent illustration of this same process in North America, where, according to Sir J. Richardson, all the wolves, foxes, and aboriginal domestic dogs have their feet broader than in the corresponding species of the Old World, and "well calculated for running on the snow." Now, in these Arctic regions, the life or death of every animal will often depend on its success in hunting over the snow when softened; and this will in part depend on the feet being broad; yet they must not be so broad as to interfere with the activity of the animal when the ground is sticky, or with its power of burrowing holes, or with other habits of life.

Domesticated cats are proved to have descended from several distinct species, and they consequently vary considerably in different parts of the world. It appears that the hybrids between almost all the smaller wild species of *Felis* are fertile, and the domesticated have certainly crossed with the wild individuals in many different countries. From the difficulty of pairing cats little or nothing has been done to produce varieties by artificial selection, and consequently cats show far less variation than any other thoroughly domesticated animals.

The variations of the other domesticated animals are described by the author in a similar manner to those noticed above. We propose in succeeding numbers of THE FIELD to give a *résumé* of Mr Darwin's researches as respects the remaining species, as cattle, sheep, pigs, &c.

