

CONTENTS

CHAPTER XIII

Inheritance, continued – reversion or atavism

Different forms of reversion – In pure or uncrossed breeds, as in pigeons, fowls, hornless cattle and sheep, in cultivated plants – Reversion in feral animals and plants – Reversion in crossed varieties and species – Reversion through bud-propagation, and by segments in the same flower or fruit – In different parts of the body in the same animal – The act of crossing a direct cause of reversion, various cases of, with instincts – Other proximate causes of reversion – Latent characters – Secondary sexual characters – Unequal development of the two sides of the body – Appearance with advancing age of characters derived from a cross – The germ, with all its latent characters, a wonderful object – Monstrosities – Peloric flowers due in some cases to reversion

[1–36] 1

CHAPTER XIV

Inheritance, continued – fixedness of character – prepotency – sexual limitation – correspondence of age

Fixedness of character apparently not due to antiquity of inheritance – Prepotency of transmission in individuals of the same family, in crossed breeds and species; often stronger in one sex than the other; sometimes due to the same character being present and visible in one breed and latent in the other – Inheritance as limited by sex – / Newly acquired characters in our domesticated animals often transmitted by one sex alone, sometimes lost by one sex alone – Inheritance at corresponding periods of life – The importance of the principle with respect to embryology; as exhibited in domesticated animals; as exhibited in the

appearance and disappearance of inherited diseases; sometimes supervening earlier in the child than in the parent – Summary of the three preceding chapters [37–61] 32

CHAPTER XV

On crossing

Free intercrossing obliterates the differences between allied breeds – When the numbers of two commingling breeds are unequal, one absorbs the other – The rate of absorption determined by prepotency of transmission, by the conditions of life, and by Natural Selection – All organic beings occasionally intercross; apparent exceptions – On certain characters incapable of fusion; chiefly or exclusively those which have suddenly appeared in the individual – On the modification of old races, and the formation of new races, by crossing – Some crossed races have bred true from their first production – On the crossing of distinct species in relation to the formation of domestic races [62–77] 54

CHAPTER XVI

Causes which interfere with the free crossing of varieties – influence of domestication on fertility

Difficulties in judging of the fertility of varieties when crossed – Various causes which keep varieties distinct, as the period of breeding and sexual preference – Varieties of wheat said to be sterile when crossed – Varieties of maize, verbascum, hollyhock, gourds, melons, and tobacco / rendered in some degree mutually sterile – Domestication eliminates the tendency to sterility natural to species when crossed – On the increased fertility of uncrossed animals and plants from domestication and cultivation [78–91] 67

CHAPTER XVII

On the good effects of crossing, and on the evil effects of close interbreeding

Definition of close interbreeding – Augmentation of morbid tendencies

– General evidence of the good effects derived from crossing, and on the evil effects of close interbreeding – Cattle, closely interbred; half-wild cattle long kept in the same parks – Sheep – Fallow-deer – Dogs, rabbits, pigs – Man, origin of his abhorrence of incestuous marriages – Fowls – Pigeons – Hive-bees – Plants, general considerations on the benefits derived from crossing – Melons, fruit-trees, peas, cabbages, wheat, and forest-trees – On the increased size of hybrid plants, not exclusively due to their sterility – On certain plants which either normally or abnormally are self-impotent, but are fertile both on the male and female side, when crossed with distinct individuals either of the same or another species – Conclusion [92–126] 80

CHAPTER XVIII

On the advantages and disadvantages of changed conditions of life: sterility from various causes

On the good derived from slight changes in the conditions of life – Sterility from changed conditions, in animals, in their native country and in menageries – Mammals, birds, and insects – Loss of secondary sexual characters and of instincts – Causes of sterility – Sterility of domesticated animals from changed conditions – Sexual incompatibility of individual animals – Sterility of plants from changed / conditions of life – Contabescence of the anthers – Monstrosities as a cause of sterility – Double flowers – Seedless fruit – Sterility from the excessive development of the organs of vegetation – From long-continued propagation by buds – Incipient sterility the primary cause of double flowers and seedless fruit [127–156] 110

CHAPTER XIX

Summary of the four last chapters, with remarks on hybridism

On the effects of crossing – The influence of domestication on fertility – Close interbreeding – Good and evil results from changed conditions of life – Varieties when crossed not invariably fertile – On the difference in fertility between crossed species and varieties – Conclusions with respect to hybridism – Light thrown on hybridism by the

illegitimate progeny of heterostyled plants – Sterility of crossed species due to differences confined to the reproductive system – Not accumulated through Natural Selection – Reasons why domestic varieties are not mutually sterile – Too much stress has been laid on the difference in fertility between crossed species and crossed varieties – Conclusion [157–175] 136

CHAPTER XX

Selection by man

Selection a difficult art – Methodical, unconscious, and Natural Selection – Results of methodical selection – Care taken in selection – Selection with plants – Selection carried on by the ancients and by semi-civilized people – Unimportant characters often attended to – Unconscious selection – As circumstances slowly change, so have our domesticated animals changed through the action of unconscious selection – Influence of different breeders on the same subvariety / Plants as affected by unconscious selection – Effects of selection as shown by the great amount of difference in the parts most valued by man [176–208] 152

CHAPTER XXI

Selection, continued

Natural Selection as affecting domestic productions – Characters which appear of trifling value often of real importance – Circumstances favourable to selection by man – Facility in preventing crosses, and the nature of the conditions – close attention and perseverance indispensable – The production of a large number of individuals especially favourable – When no selection is applied, distinct races are not formed – Highly-bred animals liable to degeneration – Tendency in man to carry the selection of each character to an extreme point, leading to divergence of character, rarely to convergence – Characters continuing to vary in the same direction in which they have already varied – Divergence of character with the extinction of intermediate varieties, leads to distinctness in our domestic races – Limit to the

power of selection – Lapse of time important – Manner in which domestic races have originated – Summary [209–236] 181

CHAPTER XXII

Causes of variability

Variability does not necessarily accompany reproduction – Causes assigned by various authors – Individual differences – Variability of every kind due to changed conditions of life – On the nature of such changes – Climate, food, excess of nutriment – Slight changes sufficient – Effects of grafting on the variability of seedling-trees – Domestic productions become habituated to changed conditions – On the accumulative action of changed conditions – Close interbreeding and the imagination of the mother supposed to / cause variability – Crossing as a cause of the appearance of new characters – Variability from the commingling of characters and from reversion – On the manner and period of action of the causes which either directly, or indirectly through the reproductive system, induce variability [237–259] 205

CHAPTER XXIII

Direct and definite action of the external conditions of life

Slight modifications in plants from the definite action of changed conditions, in size, colour, chemical properties, and in the state of the tissues – Local diseases – Conspicuous modifications from changed climate or food, etc. – Plumage of birds affected by peculiar nutriment, and by the inoculation of poison – Land-shells – Modifications of organic beings in a state of nature through the definite action of external conditions – Comparison of American and European trees – Galls – Effects of parasitic fungi – Considerations opposed to the belief in the potent influence of changed external conditions – Parallel series of varieties – Amount of variation does not correspond with the degree of change in the conditions – Bud-variation – Monstrosities produced by unnatural treatment – Summary [260–282] 225

CHAPTER XXIV

Laws of variation – Use and disuse, etc.

'Nisus formativus', or the co-ordinating power of the organization –
 On the effects of the increased use and disuse of organs – Changed
 habits of life – Acclimitization with animals and plants – Various
 methods by which this can be effected – Arrests of development –
 Rudimentary organs [283–310] / 245

CHAPTER XXV

Laws of variation, continued – correlated variability

Explanation of term correlation – Connected with development –
 Modifications correlated with the increased or decreased size of parts –
 Correlated variation of homologous parts – Feathered feet in birds
 assuming the structure of the wings – Correlation between the head
 and the extremities – Between the skin and dermal appendages –
 Between the organs of sight and hearing – Correlated modifications in
 the organs of plants – Correlated monstrosities – Correlation between
 the skull and ears – Skull and crest of feathers – Skull and horns –
 Correlation of growth complicated by the accumulated effects of
 Natural Selection – Colour as correlated with constitutional peculiari-
 ties [311–332] 269

CHAPTER XXVI

Laws of variation, continued – summary

The fusion of homologous parts – The variability of multiple and
 homologous parts – compensation of growth – Mechanical pressure –
 Relative position of flowers with respect to the axis, and of seeds in the
 ovary, as inducing variation – Analogous or parallel varieties –
 Summary of the three last chapters [333–348] 288

CHAPTER XXVII

Provisional hypothesis of pangenesis

Preliminary remarks – First part: – The facts to be connected under a single point of view, namely, the various kinds of reproduction – Regrowth of amputated parts – Graft-hybrids – The direct action of the male element on the / female – Development – The functional independence of the units of the body – Variability – Inheritance – Reversion

Second part: – Statement of the hypothesis – How far the necessary assumptions are improbable – Explanation by aid of the hypothesis of the several classes of facts specified in the first part – Conclusion

[349–399] 302

CHAPTER XXVIII

Concluding remarks

Domestication – Nature and causes of variability – Selection – Divergence and distinctness of character – Extinction of races – Circumstances favourable to selection by man – Antiquity of certain races – The question whether each particular variation has been specially preordained

[400–428] 348

INDEX

[429–495] 373 /