CHAPTER VI.

PIGEONS—*continued.*

ON THE ABORIGINAL PARENT-STOCK OF THE SEVERAL DOMESTIC RACES—HABITS OF LIFE—WILD RACES OF THE ROCK-PIGEON—DOVECOT-PIGEONS—PROOFS OF THE DESCENT OF THE SEVERAL RACES FROM COLUMBA LIVIA—FERTILITY OF THE RACES WHEN CROSSED—REVERSION TO THE PLUMAGE OF THE WILD ROCK-PIGEON—CIRCUMSTANCES FAVOURABLE TO THE FORMATION OF THE RACES—ANTIQUITY AND HISTORY OF THE PRINCIPAL RACES—MANNER OF THEIR FORMATION—SELECTION—UNCONSCIOUS SELECTION—CARE TAKEN BY FANCIERS IN SELECTING THEIR BIRDS—SLIGHTLY DIFFERENT STRAINS GRADUALLY CHANGE INTO WELL-MARKED BREEDS—EXTINCTION OF INTERMEDIATE FORMS—CERTAIN BREEDS REMAIN PERMANENT, WHILST OTHERS CHANGE—SUMMARY.

THE differences described in the last chapter between the eleven chief domestic races and between individual birds of the same race, would be of little significance, if they had not all descended from a single wild stock. The question of their origin is therefore of fundamental importance, and must be discussed at considerable length. No one will think this superfluous who considers the great amount of difference between the races, who knows how ancient many of them are, and how truly they breed at the present day. Fanciers almost unanimously believe that the different races are descended from several wild stocks, whereas most naturalists believe that all are descended from the *Columba livia* or rock-pigeon.

Temminck[1] has well observed, and Mr. Gould has made the same remark to me, that the aboriginal parent must have been a species which roosted and built its nest on rocks; and I may add that it must have been a social bird. For all the domestic races are highly social, and none are known to build or habitually to roost on trees. The awkward manner in which some pigeons, kept by me in a summer-house near an old walnut-tree, occasionally alighted on the barer branches,

[1] Temminck, 'Hist. Nat. Gén. des Pigeons,' &c., tom. i. p. 191.

was evident.[2] Nevertheless, Mr. R. Scot Skirving informs me that he often saw crowds of pigeons in Upper Egypt settling on low trees, but not on palms, in preference to alighting on the mud hovels of the natives. In India Mr. Blyth[3] has been assured that the wild *C. livia*, var. *intermedia*, sometimes roosts in trees. I may here give a curious instance of compulsion leading to changed habits: the banks of the Nile above lat. 28° 30′ are perpendicular for a long distance, so that when the river is full the pigeons cannot alight on the shore to drink, and Mr. Skirving repeatedly saw whole flocks settle on the water, and drink whilst they floated down the stream. These flocks seen from a distance resembled flocks of gulls on the surface of the sea.

If any domestic race had descended from a species which was not social, or which built its nest and roosted in trees,[4] the sharp eyes of fanciers would assuredly have detected some vestige of so different an aboriginal habit. For we have reason to believe that aboriginal habits are long retained under domestication. Thus with the common ass we see signs of its original desert life in its strong dislike to cross the smallest stream of water, and in its pleasure in rolling in the dust. The same strong dislike to cross a stream is common to the camel, which has been domesticated from a very ancient period. Young pigs, though so tame, sometimes squat when frightened, and thus try to conceal themselves even on an open and bare place. Young turkeys, and occasionally even young fowls, when the hen gives the danger-cry, run away and try to hide themselves, like young partridges or pheasants, in order that their mother may take

[2] I have heard through Sir C. Lyell from Miss Buckley, that some half-bred Carriers kept during many years near London regularly settled by day on some adjoining trees, and, after being disturbed in their loft by their young being taken, roosted on them at night.

[3] 'Annals and Mag. of Nat. Hist.,' 2nd ser., vol. xx., 1857, p. 509; and in a late volume of the Journal of the Asiatic Society.

[4] In works written on the pigeon by fanciers I have sometimes observed the mistaken belief expressed that the species which naturalists called ground-pigeons (in contradistinction to arboreal pigeons) do not perch and build on trees. In these same works by fanciers wild species resembling the chief domestic races are often said to exist in various parts of the world; but such species are quite unknown to naturalists.

flight, of which she has lost the power. The musk-duck (*Cairina moschata*) in its native country often perches and roosts on trees,[5] and our domesticated musk-ducks, though such sluggish birds, "are fond of perching on the tops of barns, walls, &c., and, if allowed to spend the night in the hen-house, the female will generally go to roost by the side of the hens, but the drake is too heavy to mount thither with ease."[6] We know that the dog, however well and regularly fed, often buries, like the fox, any superfluous food; and we see him turning round and round on a carpet, as if to trample down grass to form a bed; we see him on bare pavements scratching backwards as if to throw earth over his excrement, although, as I believe, this is never effected even where there is earth. In the delight with which lambs and kids crowd together and frisk on the smallest hillock, we see a vestige of their former alpine habits.

We have therefore good reason to believe that all the domestic races of the pigeon are descended either from some one or from several species which both roosted and built their nests on rocks, and were social in disposition. As only five or six wild species have these habits, and make any near approach in structure to the domesticated pigeon, I will enumerate them.

Firstly, the *Columba leuconota* resembles certain domestic varieties in its plumage, with the one marked and never-failing difference of a white band which crosses the tail at some distance from the extremity. This species, moreover, inhabits the Himalaya, close to the limit of perpetual snow; and therefore, as Mr. Blyth has remarked, is not likely to have been the parent of our domestic breeds, which thrive in the hottest countries. Secondly, the *C. rupestris*, of Central Asia, which is intermediate[7] between the *C. leuconota* and *livia*; but has nearly the same coloured tail as the former species. Thirdly, the *Columba littoralis* builds and roosts, according to Temminck, on rocks in the Malayan archipelago; it is white, excepting parts of the wing and the tip of the tail, which are black; its legs are livid-coloured, and this is a character not observed in any adult domestic pigeon; but I need not have mentioned this species or the closely-allied *C. luctuosa*, as they in

[5] Sir R. Schomburgk, in 'Journal R. Geograph. Soc.,' vol. xiii., 1844, p. 32.

[6] Rev. E. S. Dixon, 'Ornamental Poultry,' 1848, pp. 63, 66.

[7] Proc. Zoolog. Soc., 1859, p. 400.

fact belong to the genus Carpophaga. Fourthly, *Columba guinea*, which ranges from Guinea [8] to the Cape of Good Hope, and roosts either on trees or rocks, according to the nature of the country. This species belongs to the genus Strictœnas of Reichenbach, but is closely allied to Columba; it is to some extent coloured like certain domestic races, and has been said to be domesticated in Abyssinia; but Mr Mansfield Parkyns, who collected the birds of that country and knows the species, informs me that this is a mistake. Moreover, the *C. guinea* is characterized by the feathers of the neck having peculiar notched tips,—a character not observed in any domestic race. Fifthly, the *Columba œnas* of Europe, which roosts on trees, and builds its nest in holes, either in trees or the ground; this species, as far as external characters go, might be the parent of several domestic races; but, though it crosses readily with the true rock-pigeon, the offspring, as we shall presently see, are sterile hybrids, and of such sterility there is not a trace when the domestic races are intercrossed. It should also be observed that if we were to admit, against all probability, that any of the foregoing five or six species were the parents of some of our domestic pigeons, not the least light would be thrown on the chief differences between the eleven most strongly-marked races.

We now come to the best known rock-pigeon, the *Columba livia*, which is often designated in Europe pre-eminently as the Rock-pigeon, and which naturalists believe to be the parent of all the domesticated breeds. This bird agrees in every essential character with the breeds which have been only slightly modified. It differs from all other species in being of a slaty-blue colour, with two black bars on the wings, and with the croup (or loins) white. Occasionally birds are seen in Faroe and the Hebrides with the black bars replaced by two or three black spots; this form has been named by Brehm [9] *C. amaliæ*, but this species has not been admitted as distinct by other ornithologists. Graba [10] even found a difference in the bars on the right and left wings of the same bird in Faroe. Another and rather more distinct form is either truly wild or has become feral on the cliffs of England and was doubtfully named by Mr. Blyth [11] as *C. affinis*, but is now no longer considered by him as a distinct species. *C. affinis* is rather smaller than the rock-pigeon of the Scottish islands, and has a very different appearance owing to the wing-coverts being chequered with black, with similar marks often extending over the back. The chequering consists of a large black

[8] Temminck, 'Hist. Nat. Gén. des Pigeons,' tom. i.; also 'Les Pigeons, par Mme. Knip and Temminck. Bonaparte, however, in his 'Coup-d'œil,' believes that two closely allied species are confounded together under this name. The *C. leucocephala* of the West Indies is stated by Temminck to be a rock-pigeon; but I am informed by Mr. Gosse that this is an error.

[9] 'Handbuch der Naturgesch. Vögel Deutschlands.'

[10] 'Tagebuch, Reise nach Färo,' 1830, s. 62.

[11] 'Annals and Mag. of Nat. Hist.' vol. xix. 1847, p. 102. This excellent paper on pigeons is well worth consulting.

spot on the two sides, but chiefly on the outer side, of each feather. The wing-bars in the true rock-pigeon and in the chequered variety are, in fact, due to similar though larger spots symmetrically crossing the secondary wing-feather and the larger coverts. Hence the chequering arises merely from an extension of these marks to other parts of the plumage. Chequered birds are not confined to the coasts of England; for they were found by Graba at Faroe; and W. Thompson [12] says that at Islay fully half the wild rock-pigeons were chequered. Colonel King, of Hythe, stocked his dovecot with young wild birds which he himself procured from nests at the Orkney Islands; and several specimens, kindly sent to me by him, were all plainly chequered. As we thus see that chequered birds occur mingled with the true rock-pigeon at three distinct sites, namely, Faroe, the Orkney Islands, and Islay, no importance can be attached to this natural variation in the plumage.

Prince C. L. Bonaparte,[13] a great divider of species, enumerates, with a mark of interrogation, as distinct from *C. livia*, the *C. turricola* of Italy, the *C. rupestris* of Daouria, and the *C. schimperi* of Abyssinia; but these birds differ from *C. livia* in characters of the most trifling value. In the British Museum there is a chequered pigeon, probably the *C. schimperi* of Bonaparte, from Abyssinia. To these may be added the *C. gymnocyclus* of G. R. Gray from W. Africa, which is slightly more distinct, and has rather more naked skin round the eyes than the rock-pigeon; but from information given me by Dr. Daniell, it is doubtful whether this is a wild bird, for dovecot-pigeons (which I have examined) are kept on the coast of Guinea.

The wild rock-pigeon of India (*C. intermedia* of Strickland) has been more generally accepted as a distinct species. It differs chiefly in the croup being blue instead of snow-white; but as Mr. Blyth informs me, the tint varies, being sometimes albescent. When this form is domesticated chequered birds appear, just as occurs in Europe with the truly wild *C. livia*. Moreover we shall immediately have proof that the blue and white croup is a highly variable character; and Bechstein [14] asserts that with dovecot-pigeons in Germany this is the most variable of all the characters of the plumage. Hence it may be concluded that *C. intermedia* cannot be ranked as specifically distinct from *C. livia*.

In Madeira there is a rock-pigeon which a few ornithologists have suspected to be distinct from *C. livia*. I have examined numerous specimens collected by Mr. E. V. Harcourt and Mr. Mason. They are rather smaller than the rock-pigeon from the Shetland Islands, and their beaks are plainly thinner, but the thickness of the beak varied in the several specimens. In plumage there is remarkable

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[12] 'Natural History of Ireland,' Birds, vol. ii. (1850), p. 11. For Graba, *see* previous reference.

[13] 'Coup-d'œil sur l'Ordre des Pigeons,' 'Comptes Rendus,' 1854–55.

[14] 'Naturgeschichte. Deutschlands,' Band iv. 1795, s. 14.

diversity; some specimens are identical in every feather (I speak after actual comparison) with the rock-pigeon of the Shetland Islands; others are chequered, like *C. affinis* from the cliffs of England, but generally to a greater degree, being almost black over the whole back; others are identical with the so-called *C. intermedia* of India in the degree of blueness of the croup; whilst others have this part very pale or very dark blue, and are likewise chequered. So much variability raises a strong suspicion that these birds are domestic pigeons which have become feral.

From these facts it can hardly be doubted that *C. livia, affinis, intermedia*, and the forms marked with an interrogation by Bonaparte ought all to be included under a single species. But it is quite immaterial whether or not they are thus ranked, and whether some one of these forms or all are the progenitors of the various domestic kinds, as far as any light can thus be thrown on the differences between the more strongly-marked races. That common dovecot-pigeons, which are kept in various parts of the world, are descended from one or from several of the above-mentioned wild varieties of *C. livia*, no one who compares them will doubt. But before making a few remarks on dovecot-pigeons, it should be stated that the wild rock-pigeon has been found easy to tame in several countries. We have seen that Colonel King at Hythe stocked his dovecot more than twenty years ago with young wild birds taken at the Orkney Islands, and since then they have greatly multiplied. The accurate Macgillivray [15] asserts that he completely tamed a wild rock-pigeon in the Hebrides; and several accounts are on records of these pigeons having bred in dovecots in the Shetland Islands. In India, as Captain Hutton informs me, the wild rock-pigeon is easily tamed, and breeds readily with the domestic kind; and Mr. Blyth [16] asserts that wild birds come frequently to the dovecots and mingle freely with their inhabitants. In the ancient 'Ayeen Akbery' it is written that, if a few wild pigeons be taken, "they are speedily joined by a thousand others of their kind."

Dovecot-pigeons are those which are kept in dovecots in a semi-domesticated state; for no special care is taken of them, and they procure their own food, except during the severest weather. In England, and, judging from MM. Boitard and Corbié's work, in France, the common dovecot-pigeon exactly resembles the chequered

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[15] 'History of British Birds,' vol. i. pp. 275–284. Mr. Andrew Duncan tamed a rock-pigeon in the Shetland Islands. Mr. James Barclay, and Mr. Smith of Uyea Sound, both say that the wild rock-pigeon can be easily tamed; and the former gentleman asserts that the tamed birds breed four times a year. Dr. Lawrence Edmondstone informs me that a wild rock-pigeon came and settled in his dovecot in Balta Sound in the Shetland Islands, and bred with his pigeons; he has also given me other instances of the wild rock-pigeon having been taken young and breeding in captivity.

[16] 'Annals and Mag. of Nat. History,' vol. xix. 1847, p. 103, and vol. for 1857, p. 512.

variety of *C. livia* ; but I have seen dovecots brought from Yorkshire without any trace of chequering, like the wild rock-pigeon of the Shetland Islands. The chequered dovecots from the Orkney Islands, after having been domesticated by Colonel King for more than twenty years, differed slightly from each other in the darkness of their plumage and in the thickness of their beaks ; the thinnest beak being rather thicker than the thickest one in the Madeira birds. In Germany, according to Bechstein, the common dovecot-pigeon is not chequered. In India they often become chequered, and sometimes pied with white; the croup also, as I am informed by Mr. Blyth, becomes nearly white. I have received from Sir. J. Brooke some dovecot-pigeons, which originally came from the S. Natunas Islands in the Malay Archipelago, and which had been crossed with the Singapore dovecots: they were small and the darkest variety was extremely like the dark chequered variety with a blue croup from Madeira; but the beak was not so thin, though decidedly thinner than in the rock-pigeon from the Shetland Islands. A dovecot-pigeon sent to me by Mr. Swinhoe from Foochow, in China, was likewise rather small, but differed in no other respect. I have also received through the kindness of Dr. Daniell, four living dovecot-pigeons from Sierra Leone,[17] these were fully as large as the Shetland rock-pigeon, with even bulkier bodies. In plumage some of them were identical with the Shetland rock pigeon, but with the metallic tints apparently rather more brilliant ; others had a blue croup, and resembled the chequered variety of *C. intermedia* of India; and some were so much chequered as to be nearly black. In these four birds the beak differed slightly in length, but in all it was decidedly shorter, more massive, and stronger than in the wild rock-pigeon from the Shetland Islands, or in the English dovecot. When the beaks of these African pigeons were compared with the thinnest beaks of the wild Madeira specimens, the contrast was great; the former being fully one-third thicker in a vertical direction than the latter; so that any one at first would have felt inclined to rank these birds as specifically distinct; yet so perfectly graduated a series could be formed between the above-mentioned varieties, that it was obviously impossible to separate them.

To sum up: the wild *Columba livia*, including under this name *C. affinis*, *intermedia*, and the other still more closely-affined geographical races, has a vast range from the southern coast of Norway and the Faroe Islands to the shores of the Mediterranean, to Madeira and the Canary Islands, to Abyssinia, India, and Japan. It varies greatly in plumage, being

[17] Domestic pigeons of the common kind are mentioned as being pretty numerous in John Barbut's 'Description of the Coast of Guinea' (p. 215), published in 1746; they are said, in accordance with the name which they bear, to have been imported.

in many places chequered with black, and having either a white or blue croup or loins; it varies also slightly in the size of the beak and body. Dovecot-pigeons, which no one disputes are descended from one or more of the above wild forms, present a similar but greater range of variation in plumage, in the size of body, and in the length and thickness of the beak. There seems to be some relation between the croup being blue or white, and the temperature of the country inhabited by both wild and dovecot pigeons; for nearly all the dovecot-pigeons in the northern parts of Europe have a white croup, like that of the wild European rock-pigeon; and nearly all the dovecot-pigeons of India have a blue croup like that of the wild *C. intermedia* of India. As in various countries the wild rock-pigeon has been found easy to tame, it seems extremely probable that the dovecot-pigeons throughout the world are the descendants of at least two and perhaps more wild stocks; but these, as we have just seen, cannot be ranked as specifically distinct.

With respect to the variation of *C. livia*, we may without fear of contradiction go one step further. Those pigeon-fanciers who believe that all the chief races, such as Carriers, Pouters, Fantails, &c., are descended from distinct aboriginal stocks, yet admit that the so-called toy-pigeons, which differ from the rock-pigeon in little except colour, are descended from this bird. By toy-pigeons are meant such birds as Spots, Nuns, Helmets, Swallows, Priests, Monks, Porcelains, Swabians, Archangels, Breasts, Shields, and others in Europe, and many others in India. It would indeed be as puerile to suppose that all these birds are descended from so many distinct wild stocks as to suppose this to be the case with the many varieties of the gooseberry, heartsease, or dahlia. Yet these kinds all breed true, and many of them include sub-varieties which likewise transmit their character truly. They differ greatly from each other and from the rock-pigeon in plumage, slightly in size and proportions of body, in size of feet, and in the length and thickness of their beaks. They differ from each other in these respects more than do dovecot-pigeons. Although we may safely admit that dovecot-pigeons, which vary slightly, and that toy-pigeons, which

vary in a greater degree in accordance with their more highly-domesticated condition, are descended from *C. livia*, including under this name the above-enumerated wild geographical races; yet the question becomes far more difficult when we consider the eleven principal races, most of which have been profoundly modified. It can, however, be shown, by indirect evidence of a perfectly conclusive nature, that these principal races are not descended from so many wild stocks; and if this be once admitted, few will dispute that they are the descendants of *C. livia*, which agrees with them so closely in habits and in most characters, which varies in a state of nature, and which has certainly undergone a considerable amount of variation, as in the toy-pigeons. We shall moreover presently see how eminently favourable circumstances have been for a great amount of modification in the more carefully tended breeds.

The reasons for concluding that the several principal races are not descended from so many aboriginal and unknown stocks may be grouped under the following six heads:—*Firstly*, if the eleven chief races have not arisen from the variation of some one species, together with its geographical races, they must be descended from several extremely distinct aboriginal species; for no amount of crossing between only six or seven wild forms could produce races so distinct as Pouters, Carriers, Runts, Fantails, Turbits, Short-faced Tumblers, Jacobins, and Trumpeters. How could crossing produce, for instance, a Pouter or a Fantail, unless the two supposed aboriginal parents possessed the remarkable characters of these breeds? I am aware that some naturalists, following Pallas, believe that crossing gives a strong tendency to variation, independently of the characters inherited from either parent. They believe that it would be easier to raise a Pouter or Fantail pigeon from crossing two distinct species, neither of which possessed the characters of these races, than from any single species. I can find few facts in support of this doctrine, and believe in it only to a limited degree; but in a future chapter I shall have to recur to this subject. For our present purpose the point is not material. The question which concerns us is, whether or not many new and important characters have

arisen since man first domesticated the pigeon. On the ordinary view, variability is due to changed conditions of life; on the Pallasian doctrine, variability, or the appearance of new characters, is due to some mysterious effect from the crossing of two species, neither of which possesses the characters in question. In some few instances it is possible that well-marked races may have been formed by crossing; for instance, a Barb might perhaps be formed by a cross between a long-beaked Carrier, having large eye-wattles, and some short-beaked pigeon. That many races have been in some degree modified by crossing, and that certain varieties which are distinguished only by peculiar tints have arisen from crosses between differently-coloured varieties, is almost certain. On the doctrine, therefore, that the chief races owe their differences to their descent from distinct species, we must admit that at least eight or nine, or more probably a dozen species, all having the same habit of breeding and roosting on rocks and living in society, either now exist somewhere, or formerly existed, but have become extinct as wild birds. Considering how carefully wild pigeons have been collected throughout the world, and what conspicuous birds they are, especially when frequenting rocks, it is extremely improbable that eight or nine species, which were long ago domesticated and therefore must have inhabited some anciently known country, should still exist in the wild state and be unknown to ornithologists.

The hypothesis that such species formerly existed, but have become extinct, is in some slight degree more probable. But the extinction of so many species within the historical period is a bold hypothesis, seeing how little influence man has had in exterminating the common rock-pigeon, which agrees in all its habits of life with the domestic races. The *C. livia* now exists and flourishes on the small northern islands of Faroe, on many islands off the coast of Scotland, on Sardinia, and the shores of the Mediterranean, and in the centre of India. Fanciers have sometimes imagined that the several supposed parent-species were originally confined to small islands, and thus might readily have been exterminated; but the facts just given do not favour the probability of their extinction, even on small islands.

Nor is it probable, from what is known of the distribution of birds, that the islands near Europe should have been inhabited by peculiar species of pigeons; and if we assume that distant oceanic islands were the homes of the supposed parent-species, we must remember that ancient voyages were tediously slow, and that ships were then ill-provided with fresh food, so that it would not have been easy to bring home living birds. I have said ancient voyages, for nearly all the races of the pigeon were known before the year 1600, so that the supposed wild species must have been captured and domesticated before that date.

Secondly.—The doctrine that the chief domestic races are descended from several aboriginal species, implies that several species were formerly so thoroughly domesticated as to breed readily when confined. Although it is easy to tame most wild birds, experience shows us that it is difficult to get them to breed freely under confinement; although it must be owned that this is less difficult with pigeons than with most other birds. During the last two or three hundred years, many birds have been kept in aviaries, but hardly one has been added to our list of thoroughly reclaimed species: yet on the above doctrine we must admit that in ancient times nearly a dozen kinds of pigeons, now unknown in the wild state, were thoroughly domesticated.

Thirdly.—Most of our domesticated animals have run wild in various parts of the world; but birds, owing apparently to their partial loss of the power of flight, less often than quadrupeds. Nevertheless I have met with accounts showing that the common fowl has become feral in South America and perhaps in West Africa, and on several islands: the turkey was at one time almost feral on the banks of the Parana; and the Guinea-fowl has become perfectly wild at Ascension and in Jamaica. In this latter island the peacock, also, "has become a maroon bird." The common duck wanders from its home and becomes almost wild in Norfolk. Hybrids between the common and musk-duck which have become wild have been shot in North America, Belgium, and near the Caspian Sea. The goose is said to have run wild in La Plata. The common dovecot-pigeon has become wild at Juan

Fernandez, Norfolk Island, Ascension, probably at Madeira, on the shores of Scotland, and, as is asserted, on the banks of the Hudson in North America.[18] But how different is the case, when we turn to the eleven chief domestic races of the pigeon, which are supposed by some authors to be descended from so many distinct species! no one has ever pretended that any one of these races has been found wild in any quarter of the world; yet they have been transported to all countries, and some of them must have been carried back to their native homes. On the view that all the races are the product of variation, we can understand why they have not become feral, for the great amount of modification which they have undergone shows how long and how thoroughly they have been domesticated; and this would unfit them for a wild life.

Fourthly.—If it be assumed that the characteristic differences between the various domestic races are due to descent from several aboriginal species, we must conclude that man chose for domestication in ancient times, either intentionally or by chance, a most abnormal set of pigeons; for that species resembling such birds as Pouters, Fantails, Carriers, Barbs, Short-faced Tumblers, Turbits, &c., would be in the highest degree abnormal, as compared with all the existing members of the great pigeon family, cannot be doubted. Thus we should have to believe that man not only formerly succeeded in thoroughly domesticating several highly abnormal species, but that these same species have since all become extinct, or

[18] With respect to feral pigeons —for Juan Fernandez, *see* Bertero in 'Annal. des Sc. Nat.,' tom. xxi. p. 351. For Norfolk Islands, *see* Rev. E. S. Dixon in the 'Dovecote,' 1851, p. 14, on the authority of Mr. Gould. For Ascension I rely on MS. information given me by Mr. Layard. For the banks of the Hudson, *see* Blyth in 'Annals of Nat. Hist.,' vol. xx., 1857, p. 511. For Scotland, *see* Macgillivray, 'British Birds,' vol. i. p. 275; also Thompson's 'Nat. Hist. of Ireland, Birds,' vol. ii. p. 11. For ducks, *see* Rev. E. S. Dixon, 'Ornamental Poultry,' 1847, p. 122. For the feral hybrids of the common and musk-ducks, *see* Audubon's 'American Ornithology,' and Selys-Longchamp's 'Hybrides dans la Famille des Anatides.' For the goose, Isidore Geoffroy St.-Hilaire, 'Hist. Nat. Gén.,' tom. iii. p. 498. For guinea-fowls, *see* Gosse's 'Naturalist's Sojourn in Jamaica," p. 124; and his 'Birds of Jamaica,' for fuller particulars. I saw the wild guinea-fowl in Ascension. For the peacock, see 'A Week at Port Royal,' by a competent authority, Mr. R. Hill, p. 42. For the turkey I rely on oral information; I ascertained that they were not Curassows. With respect to fowls I will give the references in the next chapter.

are at least now unknown. This double accident is so extremely improbable that the assumed existence of so many abnormal species would require to be supported by the strongest evidence. On the other hand, if all the races are descended from *C. livia*, we can understand, as will hereafter be more fully explained, how any slight deviation in structure which first appeared would continually be augmented by the preservation of the most strongly marked individuals; and as the power of selection would be applied according to man's fancy, and not for the bird's own good, the accumulated amount of deviation would certainly be of an abnormal nature in comparison with the structure of pigeons living in a state of nature.

I have already alluded to the remarkable fact that the characteristic differences between the chief domestic races are eminently variable; we see this plainly in the great difference in the number of the tail-feathers in the Fantail, in the development of the crop in Pouters, in the length of the beak in Tumblers, in the state of the wattle in Carriers, &c. If these characters are the result of successive variations added together by selection, we can understand why they should be so variable: for these are the very parts which have varied since the domestication of the pigeon, and therefore would be likely still to vary; these variations moreover have been recently, and are still being accumulated by man's selection; therefore they have not as yet become firmly fixed.

Fifthly.—All the domestic races pair readily together, and, what is equally important, their mongrel offspring are perfectly fertile. To ascertain this fact I made many experiments, which are given in the note below; and recently Mr. Tegetmeier has made similar experiments with the same result.[19] The accurate Neumeister asserts that when dovecots

[19] I have drawn out a long table of the various crosses made by fanciers between the several domestic breeds but I do not think it worth while publishing. I have myself made for this special purpose many crosses, and all were perfectly fertile. I have united in one bird five of the most distinct races, and with patience I might undoubtedly have thus united all. The case of five distinct breeds being blended together with unimpaired fertility is important, because Gärtner has shown that it is a very general, though not, as he thought, universal rule, that complex crosses between several species are excessively sterile. I have met with only two or three

are crossed with pigeons of any other breed, the mongrels are extremely fertile and hardy.[20] MM. Boitard and Corbié[21] affirm, after their great experience, that the more distinct the breeds are which are crossed, the more productive are their mongrel offspring. I admit that the doctrine first broached by Pallas is highly probable, if not actually proved, namely, that closely allied species, which in a state of nature or when first captured would have been in some degree sterile if crossed, lose this sterility after a long course of domestication; yet when we consider the great difference between such races as Pouters, Carriers, Runts, Fantails, Turbits, Tumblers, &c., the fact of their perfect, or even increased, fertility when intercrossed in the most complicated manner becomes a strong argument in favour of their having all descended from a single species. This argument is rendered much stronger when we hear (I append in a note[22] all the cases which I have collected) that

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cases of reported sterility in the offspring of certain races when crossed. Pistor ('Das Ganze der Feldtaubenzucht,' 1831, s. 15) asserts that the mongrels from Barbs and Fantails are sterile: I have proved this to be erroneous, not only by crossing those hybrids with several other hybrids of the same parentage, but by the more severe test of pairing brother and sister hybrids *inter se*, and they were *perfectly* fertile. Temminck has stated ('Hist. Nat. Gén. des Pigeons,' tom. i. p. 197) that the Turbit or Owl will not cross readily with other breeds: but my Turbits crossed, when left free with Almond Tumblers and with Trumpeters; the same thing has occurred (Rev. E. S. Dixon. 'The Dovecot,' p. 107) between Turbits and Dovecots and Nuns. I have crossed Turbits with Barbs, as has M. Boitard (p. 34), who says the hybrids were very fertile. Hybrids from a Turbit and Fantail have been known to breed *inter se* (Riedel, 'Taubenzucht,' s. 25, and Bechstein, 'Naturgesch. Deutsch.' B. iv. s. 44. Turbits (Riedel, s. 26) have been crossed with Pouters and with Jacobins, and with a hybrid Jacobin-trumpeter (Riedel, s. 27). The latter author has, however, made some vague statements (s. 22) on the sterility of Turbits when crossed with certain other crossed breeds. But I have little doubt that the Rev. E. S. Dixon's explanation of such statements is correct, *viz. that individual birds* both with Turbits and other breeds are occasionally sterile.

[20] 'Das Ganze der Taubenzucht,' s. 18.

[21] 'Les Pigeons,' &c., p. 35.

[22] Domestic pigeons pair readily with the allied *C. œnas* (Bechstein, 'Naturgesch. Deutschlands,' B. iv. s. 3); and Mr. Brent has made the same cross several times in England, but the young were very apt to die at about ten days old; one hybrid which he reared (from *C. œnas* and a male Antwerp Carrier) paired with a Dragon, *but never laid eggs*. Bechstein further states (s. 26) that the domestic pigeon will cross with *C. palumbus*, *Turtur risoria* and *T. vulgaris*, but nothing is said of the fertility of the hybrids, and this would have been mentioned had the fact been ascertained. In the Zoological Gardens

hardly a single well-ascertained instance is known of hybrids between two true species of pigeons being fertile, *inter se*, or even when crossed with one of their pure parents.

Sixthly.—Excluding certain important characteristic differences, the chief races agree most closely both with each other and with *C. livia* in all other respects. As previously observed, all are eminently sociable; all dislike to perch or roost, and refuse to build in trees; all lay two eggs, and this is not a universal rule with the Columbidæ; all, as far as I can hear, require the same time for hatching their eggs; all can endure the same great range of climate; all prefer the same food, and are passionately fond of salt; all exhibit (with the asserted exception of the Finnikin and Turner which do not differ much in any other character) the same peculiar gestures when courting the females; and all (with the exception of Trumpeters

(MS. report to me from Mr. James Hunt) a male hybrid from *Turtur vulgaris* and a domestic pigeon "paired with several different species of pigeons and doves, but none of the eggs were good." Hybrids from *C. œnas* and *gymnophthalmos* were sterile. In Loudon's 'Mag. of Nat. Hist.' vol. vii. 1834, p. 154, it is said that a male hybrid (from *Turtur vulgaris* male, and the cream-coloured *T. risoria* female) paired during two years with a female *T. risoria*, and the latter laid many eggs, but all were sterile. MM. Boitard and Corbié ('Les Pigeons,' p. 235) state that the hybrids from these two turtle-doves are invariably sterile both *inter se* and with either pure parent. The experiment was tried by M. Corbié "avec une espèce d'obstination;" and likewise by M. Mauduyt, and by M. Vieillot. Temminck also found the hybrids from these two species quite barren. Therefore, when Bechstein ('Naturgesch. Deutschlands Vögel,' B. 4, s. 101) asserts that the hybrids from these two turtle-doves propagate *inter se* equally well with pure species, and when a writer in the 'Field' newspaper (in a letter dated Nov. 10th, 1853) makes a similar assertion, it would appear that there must be some mistake; though what the mistake is I know not, as Bechstein at least must have known the white *variety* of *T. risoria*: it would be an unparalleled fact if the same two species sometimes produced *extremely* fertile, and sometimes *extremely* barren, offspring. In the MS. report from the Zoological Gardens it is said that hybrids from *Turtur vulgaris* and *suratensis*, and from *T. vulgaris* and *Ectopistes migratorius*, were sterile. Two of the latter male hybrids paired with their pure parents, viz. *Turtur vulgaris* and the Ectopistes, and likewise with *T. risoria* and with *Columba œnas*, and many eggs were produced, but all were barren. At Paris, hybrids have been raised (Isid. Geoffroy Saint-Hilaire, 'Hist. Nat. Générale,' tom. iii. p. 180) from *Turtur auritus* with *T. cambayensis* and with *T. suratensis*; but nothing is said of their fertility. At the Zoological Gardens of London the *Goura coronata* and *victoriæ* produced a hybrid which paired with the pure *G. coronata*, and laid several eggs, but these proved barren. In 1860 *Columba gymnophthalmos* and *maculosa* produced hybrids in these same gardens.

and Laughers, which likewise do not differ much in any other character) coo in the same peculiar manner, unlike the voice of any other wild pigeon. All the coloured breeds display the same peculiar metallic tints on the breast, a character far from general with pigeons. Each race presents nearly the same range of variation in colour; and in most of the races we have the same singular correlation between the development of down in the young and the future colour of plumage. All have the proportional length of their toes, and of their primary wing-feathers, nearly the same,—characters which are apt to differ in the several members of the Columbidæ. In those races which present some remarkable deviation of structure, such as in the tail of Fantails, crop of Pouters, beak of Carriers and Tumblers, &c., the other parts remain nearly unaltered. Now every naturalist will admit that it would be scarcely possible to pick out a dozen natural species in any family which should agree closely in habits and in general structure, and yet should differ greatly in a few characters alone. This fact is explicable through the doctrine of natural selection; for each successive modification of structure in each natural species is preserved, solely because it is of service; and such modifications when largely accumulated imply a great change in the habits of life, and this will almost certainly lead to other changes of structure throughout the whole organization. On the other hand, if the several races of the pigeon have been produced by man through selection and variation, we can readily understand how it is that they should still all resemble each other in habits and in those many characters which man has not cared to modify, whilst they differ to so prodigious a degree in those parts which have struck his eye or pleased his fancy.

Besides the points above enumerated, in which all the domestic races resemble *C. livia* and each other, there is one which deserves special notice. The wild rock-pigeon is of a slaty-blue colour; the wings are crossed by two bars; the croup varies in colour, being generally white in the pigeon of Europe, and blue in that of India; the tail has a black bar close to the end, and the outer webs of the outer tail-feathers are edged with white, except near the tips. These combined

characters are not found in any wild pigeon besides *C. livia*. I have looked carefully through the great collections of pigeons in the British Museum, and I find that a dark bar at the end of the tail is common; that the white edging to the outer tail-feathers is not rare; but that the white croup is extremely rare, and the two black bars on the wings occur in no other pigeon, excepting the alpine *C. leuconota* and *C. rupestris* of Asia. Now if we turn to the domestic races, it is highly remarkable, as an eminent fancier, Mr. Wicking, observed to me, that, whenever a blue bird appears in any race, the wings almost invariably show the double black bars.[23] The primary wing-feathers may be white or black, and the whole body may be of any colour, but if the wing-coverts are blue, the two black bars are sure to appear. I have myself seen, or acquired trustworthy evidence, as given below,[24] of

[23] There is one exception to the rule, namely, in a sub-variety of the Swallow of German origin, which is figured by Neumeister, and was shown to me by Mr. Wicking. This bird is blue, but has not the black wing-bars; for our object, however, in tracing the descent of the chief races, this exception signifies the less as the Swallow approaches closely in structure to *C. livia*. In many sub-varieties the black bars are replaced by bars of various colours. The figures given by Neumeister are sufficient to show that, if the wings alone are blue, the black wing-bars appear.

[24] I have observed blue birds with all the above-mentioned marks in the following races, which seemed to be perfectly pure, and were shown at various exhibitions. Pouters, with the double black wing-bars, with white croup, dark bar to end of tail, and white edging to outer tail-feathers. Turbits, with all these same characters. Fantails with the same; but the croup in some was bluish or pure blue. Mr. Wicking bred blue Fantails from two black birds. Carriers (including the Bagadotten of Neumeister) with all the marks: two birds which I examined had white, and two had blue croups; the white edging to the outer tail-feathers was not present in all. Mr. Corker, a great breeder, assures me that, if black carriers are matched for many successive generations, the offspring become first ash-coloured, and then blue with black wing-bars. Runts of the elongated breed had the same marks, but the croup was pale blue; the outer tail-feathers had white edges. Neumeister figures the great Florence Runt of a blue colour with black bars. Jacobins are very rarely blue, but I have received authentic accounts of at least two instances of the blue variety with black bars having appeared in England; blue Jacobins were bred by Mr. Brent from two black birds. I have seen common Tumblers, both Indian and English, and Short-faced Tumblers, of a blue colour, with black wing-bars, with the black bar at the end of the tail, and with the outer tail-feathers edged with white; the croup in all was blue, or extremely pale blue, never absolutely white. Blue Barbs and Trumpeters seem to be excessively rare; but Neumeister, who may be implicitly trusted, figures blue varieties of both, with black wing-bars. Mr. Brent informs me that he has seen a

blue birds with black bars on the wing, with the croup either white or very pale or dark blue, with the tail having a terminal black bar, and with the outer feathers externally edged with white or very pale coloured, in the following races, which, as I carefully observed in each case, appeared to be perfectly true: namely, in Pouters, Fantails, Tumblers, Jacobins, Turbits, Barbs, Carriers, Runts of three distinct varieties, Trumpeters, Swallows, and in many other toy-pigeons, which as being closely allied to *C. livia*, are not worth enumerating. Thus we see that, in purely-bred races of every kind known in Europe, blue birds occasionally appear having all the marks which characterise *C. livia*, and which concur in no other wild species. Mr. Blyth, also, has made the same observation with respect to the various domestic races known in India.

Certain variations in the plumage are equally common in the wild *C. livia*, in dovecot-pigeons, and in all the most highly modified races. Thus, in all, the croup varies from white to blue, being most frequently white in Europe, and very generally blue in India.[25] We have seen that the wild *C. livia* in Europe, and dovecots in all parts of the world, often have the upper wing-coverts chequered with black; and all the most distinct races, when blue, are occasionally chequered in precisely the same manner. Thus I have seen Pouters, Fantails, Carriers, Turbits, Tumblers (Indian and English), Swallows, Bald-pates, and other toy-pigeons blue and chequered; and Mr. Esquilant has seen a chequered Runt. I bred from two pure blue Tumblers a chequered bird.

The facts hitherto given refer to the occasional appearance in pure races of blue birds with black wing-bars, and likewise

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blue Barb; and Mr. H. Weir, as I am informed by Mr. Tegetmeier, once bred a silver (which means very pale blue) Barb from two yellow birds.

[25] Mr. Blyth informs me that all the domestic races in India have the croup blue; but this is not invariable, for I possess a very pale blue Simmali pigeon with the croup perfectly white, sent to me by Sir W. Elliot from Madras. A slaty-blue and chequered Nakshi pigeon has some white feathers on the croup alone. In some other Indian pigeons there were a few white feathers confined to the croup, and I have noticed the same fact in a carrier from Persia. The Java Fantail (imported into Amoy, and thence sent me) has a perfectly white croup.

of blue and chequered birds; but it will now be seen that when two birds belonging to distinct races are crossed, neither of which have, nor probably have had during many generations, a trace of blue in their plumage, or a trace of wing-bars and the other characteristic marks, they very frequently produce mongrel offspring of a blue colour, sometimes chequered, with black wing-bars, &c.; or if not of a blue colour, yet with the several characteristic marks more or less plainly developed. I was led to investigate this subject from MM. Boitard and Corbié[26] having asserted that from crosses between certain breeds it is rare to get anything but bisets or dovecot pigeons, which, as we know, are blue birds with the usual characteristic marks. We shall hereafter see that this subject possesses, independently of our present object, considerable interest, so that I will give the results of my own trials in full. I selected for experiment races which, when pure, very seldom produce birds of a blue colour, or have bars on their wings and tail.

The Nun is white, with the head, tail, and primary wing-feathers black; it is a breed which was established as long ago as the year 1600. I crossed a male Nun with a female red common Tumbler, which latter variety generally breeds true. Thus neither parent had a trace of blue in the plumage, or of bars on the wing and tail. I should premise that common Tumblers are rarely blue in England. From the above cross I reared several young: one was red over the whole back, but with the tail as blue as that of the rock-pigeon; the terminal bar, however, was absent, but the outer feathers were edged with white: a second and third nearly resembled the first, but the tail in both presented a trace of the bar at the end: a fourth was brownish, and the wings showed a trace of the double bar: a fifth was pale blue over the whole breast, back, croup, and tail, but the neck and primary wing-feathers were reddish; the wings presented two distinct bars of a red colour; the tail was not barred, but the outer feathers were edged with white. I crossed this last curiously coloured bird with a black mongrel of complicated descent, namely, from a black Barb, a Spot, and

[26] 'Les Pigeons,' &c., p. 37.

Almond-tumbler, so that the two young birds produced from this cross included the blood of five varieties, none of which had a trace of blue or of wing and tail-bars: one of the two young birds was brownish-black, with black wing-bars; the other was reddish-dun, with reddish wing-bars, paler than the rest of the body, with the croup pale blue, the tail bluish with a trace of the terminal bar.

Mr. Eaton[27] matched two Short-faced Tumblers, namely, a splash cock and kite hen (neither of which are blue or barred), and from the first nest he got a perfect blue bird, and from the second a silver or pale blue bird, both of which, in accordance with all analogy, no doubt presented the usual characteristic marks.

I crossed two male black Barbs with two female red Spots. These latter have the whole body and wings white, with a spot on the forehead, the tail and tail-coverts red; the race existed at least as long ago as 1676, and now breeds perfectly true, as was known to be the case in the year 1735.[28] Barbs are uniformly-coloured birds, with rarely even a trace of bars on the wing or tail; they are known to breed very true. The mongrels thus raised were black or nearly black, or dark or pale brown, sometimes slightly piebald with white: of these birds no less than six presented double wing-bars; in two the bars were conspicuous and quite black; in seven some white feathers appeared on the croup; and in two or three there was a trace of the terminal bar to the tail, but in none were the outer tail-feathers edged with white.

I crossed black Barbs (of two excellent strains) with purely-bred, snow-white Fantails. The mongrels were generally quite black, with a few of the primary wing and tail feathers white: others were dark reddish-brown, and others snow-white: none had a trace of wing-bars or of the white croup. I then paired together two of these mongrels, namely, a brown and black bird, and their offspring displayed wing-bars, faint, but of a darker brown than the rest of body. In a second brood from the same parents a brown bird was produced, with several white feathers confined to the croup.

[27] 'Treatise on Pigeons,' 1858, p. 145.

[28] J. Moore's 'Columbarium,' 1735; in J. M. Eaton's edition, 1852, p. 71.

I crossed a male dun Dragon belonging to a family which had been dun-coloured without wing-bars during several generations, with a uniform red Barb (bred from two black Barbs); and the offspring presented decided but faint traces of wing-bars. I crossed a uniform red male Runt with a White trumpeter; and the offspring had a slaty-blue tail with a bar at the end, and with the outer feathers edged with white. I also crossed a female black and white chequered Trumpeter (of a different strain from the last) with a male Almond-tumbler, neither of which exhibited a trace of blue, or of the white croup, or of the bar at end of tail: nor is it probable that the progenitors of these two birds had for many generations exhibited any of these characters, for I have never even heard of a blue Trumpeter in this country, and my Almond-tumbler was purely bred; yet the tail of this mongrel was bluish, with a broad black bar at the end, and the croup was perfectly white. It may be observed in several of these cases, that the tail first shows a tendency to become by reversion blue; and this fact of the persistency of colour in the tail and tail-coverts [29] will surprise no one who has attended to the crossing of pigeons.

The last case which I will give is the most curious. I paired a mongrel female Barb-fantail with a mongrel male Barb-spot; neither of which mongrels had the least blue about them. Let it be remembered that blue Barbs are excessively rare; that Spots, as has been already stated, were perfectly characterised in the year 1676, and breed perfectly true; this likewise is the case with white Fantails, so much so that I have never heard of white Fantails throwing any other colour. Nevertheless the offspring from the above two mongrels was of exactly the same blue tint as that of the wild rock-pigeon from the Shetland Islands over the whole

[29] I could give numerous examples; two will suffice. A mongrel, whose four grandparents were a white Turbit, white Trumpeter, white Fantail, and blue Pouter, was white all over, except a very few feathers about the head and on the wings, but the whole tail and tail-coverts were dark bluish-grey. Another mongrel whose four grandparents were a red Runt, white Trumpeter, white Fantail, and the same blue Pouter, was pure white tal over, except the tail and upper aill-coverts, which were pale fawn, and except the faintest trace of double wing-bars of the same pale fawn tint.

back and wings; the double black wing-bars were equally conspicuous; the tail was exactly alike in all its characters, and the croup was pure white; the head, however, was tinted with a shade of red, evidently derived from the Spot, and was of a paler blue than in the rock-pigeon, as was the stomach. So that two black Barbs, a red Spot, and a white Fantail, as the four purely-bred grandparents, produced a bird exhibiting the general blue colour, together with every characteristic mark, the wild *Columba livia*.

With respect to crossed breeds frequently producing blue birds chequered with black, and resembling in all respects both the dovecot-pigeon and the chequered wild variety of the rock-pigeon, the statement before referred to by MM. Boitard and Corbié would almost suffice; but I will give three instances of the appearance of such birds from crosses in which one alone of the parents or great-grandparents was blue, but not chequered. I crossed a male blue Turbit with a snow-white Trumpeter, and the following year with a dark, leaden-brown, Short-faced Tumbler; the offspring from the first cross were as perfectly chequered as any dovecot-pigeon; and from the second, so much so as to be nearly as black as the most darkly chequered rock-pigeon from Madeira. Another bird, whose great-grandparents were a white Trumpeter, a white Fantail, a white Red-spot, a red Runt, and a blue Pouter, was slaty-blue and chequered exactly like a dovecot-pigeon. I may here add a remark made to me by Mr. Wicking, who has had more experience than any other person in England in breeding pigeons of various colours: namely, that when a blue, or a blue and chequered bird, having black wing-bars, once appears in any race and is allowed to breed, these characters are so strongly transmitted that it is extremely difficult to eradicate them.

What, then, are we to conclude from this tendency in all the chief domestic races, both when purely bred and more especially when intercrossed, to produce offspring of a blue colour, with the same characteristic marks, varying in the same manner, as in *Columbia livia*? If we admit that these races are all descended from *C. livia*, no breeder will doubt that the occasional appearance of blue birds thus characterised

is accounted for on the well-known principle of "throwing back" or reversion. Why crossing should give so strong a tendency to reversion, we do not with certainty know; but abundant evidence of this fact will be given in the following chapters. It is probable that I might have bred even for a century pure black Barbs, Spots, Nuns, white Fantails, Trumpeters, &c., without obtaining a single blue or barred bird; yet by crossing these breeds I reared in the first and second generation, during the course of only three or four years, a considerable number of young birds, more or less plainly coloured blue, and with most of the characteristic marks. When black and white, or black and red birds, are crossed, it would appear that a slight tendency exists in both parents to produce blue offspring, and that this, when combined, overpowers the separate tendency in either parent to produce black, or white, or red offspring.

If we reject the belief that all the races of the pigeon are the modified descendants of *C. livia*, and suppose that they are descended from several aboriginal stocks, then we must choose between the three following assumptions: firstly, that at least eight or nine species formerly existed which were aboriginally coloured in various ways, but have since varied in exactly the same manner so as to assume the colouring of *C. livia;* but this assumption throws not the least light on the appearance of such colours and marks when the races are crossed. Or secondly, we may assume that the aboriginal species were all coloured blue, and had the wing-bars and other characteristic marks of *C. livia*,—a supposition which is highly improbable, as besides this one species no existing member of the Columbidæ presents these combined characters; and it would not be possible to find any other instance of several species identical in plumage, yet as different in important points of structure as are Pouters, Fantails, Carriers, Tumblers, &c. Or lastly, we may assume that all the races, whether descended from *C. livia* or from several aboriginal species, although they have been bred with so much care and are so highly valued by fanciers, have all been crossed within a dozen or score of generations with *C. livia*, and have thus acquired their tendency to produce

blue birds with the several characteristic marks. I have said that it must be assumed that each race has been crossed with *C. livia* within a dozen, or, at the utmost, within a score of generations; for there is no reason to believe that crossed offspring ever revert to one of their ancestors when removed by a greater number of generations. In a breed which has been crossed only once, the tendency to reversion will naturally become less and less in the succeeding generations, as in each there will be less and less of the blood of the foreign breed; but when there has been no cross with a distinct breed, and there is a tendency in both parents to *revert to some long-lost character*, this tendency, for all that we can see to the contrary, may be transmitted undiminished for an indefinite number of generations. These two distinct cases of reversion are often confounded together by those who have written on inheritance.

Considering, on the one hand, the improbability of the three assumptions which have just been discussed, and, on the other hand, how simply the facts are explained on the principle of reversion, we may conclude that the occasional appearance in all the races, both when purely bred and more especially when crossed, of blue birds, sometimes chequered, *with double wing-bars, with white or blue croups*, with a bar at the end of the tail, and with the outer tail-feathers edged with white, affords an argument of the greatest weight in favour of the view that all are descended from *Columba livia*, including under this name the three or four wild varieties or sub-species before enumerated.

To sum up the six foregoing arguments, which are opposed to the belief that the chief domestic races are the descendants of at least eight or nine or perhaps a dozen species; for the crossing of any less number would not yield the characteristic differences between the several races. *Firstly*, the improbability that so many species *should still exist somewhere*, but be unknown to ornithologists, or that they should have become within the historical period extinct, although man has had so little influence in exterminating the wild *C. livia*. *Secondly*, the improbability of man in former times having thoroughly domesticated and rendered fertile under confine-

ment so many species. *Thirdly*, these supposed species having nowhere become feral. *Fourthly*, the extraordinary fact that man should, intentionally or by chance, have chosen for domestication several species, extremely abnormal in character; and furthermore, the points of structure which render these supposed species so abnormal being now highly variable. *Fifthly*, the fact of all the races, though differing in many important points of structure, producing perfectly fertile mongrels; whilst all the hybrids which have been produced between even closely allied species in the pigeon-family are sterile. *Sixthly*, the remarkable statements just given on the tendency in all the races, both when purely bred and when crossed, to revert in numerous minute details of colouring to the character of the wild rock-pigeon, and to vary in a similar manner. To these arguments may be added the extreme improbability that a number of species formerly existed, which differed greatly from each other in some few points, but which resembled each other as closely as do the domestic races in other points of structure, in voice, and in all their habits of life. When these several facts and arguments are fairly taken into consideration, it would require an overwhelming amount of evidence to make us admit that the chief domestic races are descended from several aboriginal stocks; and of such evidence there is absolutely none.

The belief that the chief domestic races are descended from several wild stocks no doubt has arisen from the apparent improbability of such great modifications of structure having been effected since man first domesticated the rock-pigeon. Nor am I surprised at any degree of hesitation in admitting their common parentage: formerly, when I went into my aviaries and watched such birds as Pouters, Carriers, Barbs, Fantails, and Short-faced Tumblers, &c., I could not persuade myself that all had descended from the same wild stock, and that man had consequently in one sense created these remarkable modifications. Therefore I have argued the question of their origin at great, and, as some will think, superfluous length.

Finally, in favour of the belief that all the races are

descended from a single stock, we have in *Columba livia* a still existing and widely distributed species, which can be and has been domesticated in various countries. This species agrees in most points of structure and in all its habits of life, as well as occasionally in every detail of plumage, with the several domestic races. It breeds freely with them, and produces fertile offspring. It varies in a state of nature,[30] and still more so when semi-domesticated, as shown by comparing the Sierra Leone pigeons with those of India, or with those which apparently have run wild in Madeira. It has undergone a still greater amount of variation in the case of the numerous toy-pigeons, which no one supposes to be descended from distinct species; yet some of these toy-pigeons have transmitted their character truly for centuries. Why, then, should we hesitate to believe in that greater amount of variation which is necessary for the production of the eleven chief races? It should be borne in mind that in two of the most strongly-marked races, namely, Carriers and Short-faced Tumblers, the extreme forms can be connected with the parent-species by graduated differences not greater than those which may be observed between the dovecot-pigeons inhabiting different countries, or between the various kinds of toy-pigeons,—gradations which must certainly be attributed to variation.

That circumstances have been eminently favourable for the modification of the pigeon through variation and selection will now be shown. The earliest record, as has been pointed out to me by Professor Lepsius, of pigeons in a domesticated condition, occurs in the fifth Egyptian dynasty, about 3000 B.C.;[31] but Mr. Birch, of the British Museum, informs me that the pigeon appears in a bill of fare in the previous dynasty. Domestic pigeons are mentioned in Genesis, Leviticus, and Isaiah.[32] In the time of the Romans,

[30] It deserves notice, as bearing on the general subject of variation, that not only *C. livia* presents several wild forms, regarded by some naturalists as species and by others as sub-species or as mere varieties, but that the species of several allied genera are in the same predicament. This is the case, as Mr. Blyth has remarked to me, with Treron, Palumbus, and Turtur.

[31] 'Denkmäler,' Abth. ii. Bl. 70.

[32] The 'Dovecote,' by the Rev. E. S. Dixon, 1851, pp. 11-13. Adolphe Pictet (in his 'Les Origines Indo-

as we hear from Pliny,[33] immense prices were given for pigeons; "nay, they are come to this pass, that they can reckon up their pedigree and race." In India, about the year 1600, pigeons were much valued by Akber Khan: 20,000 birds were carried about with the court, and the merchants brought valuable collections. "The monarch of Iran and Turan sent him some very rare breeds. His Majesty," says the courtly historian, "by crossing the breeds, which method was never practised before, has improved them astonishingly."[34] Akber Khan possessed seventeen distinct kinds, eight of which were valuable for beauty alone. At about this same period of 1600 the Dutch, according to Aldrovandi, were as eager about pigeons as the Romans had formerly been. The breeds which were kept during the fifteenth century in Europe and in India apparently differed from each other. Tavernier, in his Travels in 1677, speaks, as does Chardin in 1735, of the vast number of pigeon-houses in Persia; and the former remarks that, as Christians were not permitted to keep pigeons, some of the vulgar actually turned Mahometans for this sole purpose. The Emperor of Morocco had his favourite keeper of pigeons, as is mentioned in Moore's treatise, published 1737. In England, from the time of Willughby in 1678 to the present day, as well as in Germany and in France, numerous treatises have been published on the pigeon. In India, about a hundred years ago, a Persian treatise was written; and the writer thought it no light affair, for he begins with a solemn invocation, "in the name of God, the gracious and merciful." Many large towns, in Europe and the United States, now have their societies of devoted pigeon-fanciers: at present there are three such societies in London. In India, as I hear from Mr. Blyth, the inhabitants of Delhi and of some other great cities are eager fanciers. Mr. Layard informs me

Européennes,' 1859, p. 399) states that there are in the ancient Sanscrit language between 25 and 30 names for the pigeon, and other 15 or 16 Persian names; none of these are common to the European languages. This fact indicates the antiquity of the domestication of the pigeon in the East.

[33] English translation, 1601, Book x. ch. xxxvii.

[34] 'Ayeen Akbery,' translated by F. Gladwin, 4to edit., vol. i. p. 270.

that most of the known breeds are kept in Ceylon. In China, according to Mr. Swinhoe of Amoy, and Dr. Lockhart of Shangai, Carriers, Fantails, Tumblers, and other varieties are reared with care, especially by the bonzes or priests. The Chinese fasten a kind of whistle to the tail-feathers of their pigeons, and as the flock wheels through the air they produce a sweet sound. In Egypt the late Abbas Pacha was a great fancier of Fantails. Many pigeons are kept at Cairo and Constantinople, and these have lately been imported by native merchants, as I hear from Sir W. Elliot, into Southern India, and sold at high prices.

The foregoing statements show in how many countries, and during how long a period, many men have been passionately devoted to the breeding of pigeons. Hear how an enthusiastic fancier at the present day writes: "If it were possible for noblemen and gentlemen to know the amazing amount of solace and pleasure derived from Almond Tumblers, when they begin to understand their properties, I should think that scarce any nobleman or gentleman would be without their aviaries of Almond Tumblers."[35] The pleasure thus taken is of paramount importance, as it leads amateurs carefully to note and preserve each slight deviation of structure which strikes their fancy. Pigeons are often closely confined during their whole lives; they do not partake of their naturally varied diet; they have often been transported from one climate to another; and all these changes in their conditions of life would be likely to cause variability. Pigeons have been domesticated for nearly 5000 years, and have been kept in many places, so that the numbers reared under domestication must have been enormous: and this is another circumstance of high importance, for it obviously favours the chance of rare modifications of structure occasionally appearing. Slight variations of all kinds would almost certainly be observed, and, if valued, would, owing to the following circumstances, be preserved and propagated with unusual facility. Pigeons, differently from any other domesticated animal, can easily be mated for

[35] J. M. Eaton, 'Treatise on the Almond Tumbler,' 1851; Preface, p. vi.

life, and, though kept with other pigeons, rarely prove unfaithful to each other. Even when the male does break his marriage-vow, he does not permanently desert his mate. I have bred in the same aviaries many pigeons of different kinds, and never reared a single bird of an impure strain. Hence a fancier can with the greatest ease select and match his birds. He will also see the good results of his care; for pigeons breed with extraordinary rapidity. He may freely reject inferior birds, as they serve at an early age as excellent food.

History of the principal Races of the Pigeon.[36]

Before discussing the means and steps by which the chief races have been formed, it will be advisable to give some historical details, for more is known of the history of the pigeon, little though this is, than of any other domesticated animal. Some of the cases are interesting as proving how long domestic varieties may be propagated with exactly the same or nearly the same characters; and other cases are still more interesting as showing how slowly but steadily races have been greatly modified during successive generations. In the last chapter I stated that Trumpeters and Laughers, both so remarkable for their voices, seem to have been perfectly characterised in 1735; and Laughers were apparently known in India before the year 1600. Spots in 1676, and Nuns in the time of Aldrovandi, before 1600, were coloured exactly as they now are. Common Tumblers and Ground Tumblers displayed in India, before the year 1600, the same extraordinary peculiarities of flight as at the present day, for they are well described in the 'Ayeen Akbery.' These breeds may all have existed for a much longer period; we know only that they were perfectly characterised at the dates above given. The *average* length of life of the domestic pigeon is probably about five or six years; if so, some of these races have retained their character perfectly for at least forty or fifty generations.

Pouters.—These birds, as far as a very short description serves for comparison, appear to have been well characterised in Aldrovandi's time,[37] before the year 1600. Length of body and length of leg are at the present time the two chief points of excellence. In 1735 Moore said (see Mr. J. M. Eaton's edition)—and Moore was a first-rate fancier—that he once saw a bird with a body 20 inches in length, "though 17 or 18 inches is reckoned a very good length;" and he has seen the legs very nearly 7 inches in length, yet a leg 6½ or 6¾ long "must be allowed to be a very good one." Mr. Bult, the most

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[36] As in the following discussion I often speak of the present time, I should state that this chapter was completed in the year 1858.

[37] 'Ornithologie,' 1600, vol. ii. p. 360.

successful breeder of Pouters in the world, informs me that at present (1858) the standard length of the body is not less than 18 inches; but he has measured one bird 19 inches in length, and has heard of 20 and 22 inches, but doubts the truth of these latter statements. The standard length of the leg is now 7 inches, but Mr. Bult has recently measured two of his own birds with legs 7½ long. So that in the 123 years which have elapsed since 1735 there has been hardly any increase in the standard length of the body; 17 or 18 inches was formerly reckoned a very good length, and now 18 inches is the minimum standard; but the length of leg seems to have increased, as Moore never saw one quite 7 inches long; now the standard is 7, and two of Mr Bult's birds measured 7½ inches in length. The extremely slight improvement in Pouters, except in the length of the leg, during the last 123 years, may be partly accounted for by the neglect which they suffered, as I am informed by Mr. Bult, until within the last 20 or 30 years. About 1765[38] there was a change of fashion, stouter and more feathered legs being preferred to thin and nearly naked legs.

Fantails.—The first notice of the existence of this breed is in India, before the year 1600, as given in the 'Ayeen Akbery;'[39] at this date, judging from Aldrovandi, the breed was unknown in Europe. In 1677 Willughby speaks of a Fantail with 26 tail-feathers; in 1735 Moore saw one with 36 feathers; and in 1824 MM. Boitard and Corbié assert that in France birds can easily be found with 42 tail-feathers. In England, the number of the tail-feathers is not at present so much regarded as their upward direction and expansion. The general carriage of the bird is likewise now much valued. The old descriptions do not suffice to show whether in these latter respects there has been much improvement: but if Fantails with their heads and tails touching had formerly existed, as at the present time, the fact would almost certainly have been noticed. The Fantails which are now found in India probably show the state of the race, as far as carriage is concerned, at the date of their introduction into Europe; and some, said to have been brought from Calcutta, which I kept alive, were in a marked manner inferior to our exhibition birds. The Java Fantail shows the same difference in carriage; and although Mr. Swinhoe has counted 18 and 24 tail-feathers in his birds, a first-rate specimen sent to me had only 14 tail-feathers.

Jacobins.—This breed existed before 1600, but the hood, judging from the figure given by Aldrovandi, did not enclose the head nearly so perfectly as at present: nor was the head then white; nor were the wings and tail so long, but this last character might have been overlooked by the rude artist. In Moore's time, in 1735, the Jacobin was considered the smallest kind of pigeon, and the bill is

[38] 'A Treatise on Domestic Pigeons,' dedicated to Mr. Mayor, 1765. Preface, p. xiv.

[39] Mr. Blyth has given a translation of part of the 'Ayeen Akbery' in 'Annals and Mag. of Nat. Hist.,' vol. xix. 1847, p. 104.

said to be very short. Hence either the Jacobin, or the other kinds with which it was then compared, must since that time have been considerably modified; for Moore's description (and it must be remembered that he was a first-rate judge) is clearly not applicable, as far as size of body and length of beak are concerned, to our present Jacobins. In 1795, juging from Bechstein, the breed had assumed its present character.

Turbits.—It has generally been supposed by the older writers on pigeons, that the Turbit is the Cortbeck of Aldrovandi; but if this be the case, it is an extraordinary fact that the characteristic frill should not have been noticed. The beak, moreover, of the Cortbeck is described as closely resembling that of the Jacobin, which shows a change in the one or the other race. The Turbit, with its characteristic frill, and bearing its present name, is described by Willughby in 1677; and the bill is said to be like that of the bullfinch,—a good comparison, but now more strictly applicable to the beak of the Barb. The sub-breed called the Owl was well known in Moore's time, in 1735,

Tumblers—Common Tumblers, as well as Ground Tumblers, perfect as far as tumbling is concerned, existed in India before the year 1600; and at this period diversified modes of flight, such as flying at night, the ascent to a great height, and manner of descent, seem to have been much attended to in India, as at the present time. Belon [40] in 1555 saw in Paphlagonia what he describes as "a very new thing, viz. pigeons which flew so high in the air that they were lost to view, but returned to their pigeon-house without separating." This manner of flight is characteristic of our present Tumblers, but it is clear that Belon would have mentioned the act of tumbling if the pigeons described by him had tumbled. Tumblers were not known in Europe in 1600, as they are not mentioned by Aldrovandi, who discusses the flight of pigeons. They are briefly alluded to by Willughby, in 1687, as small pigeons "which show like footballs in the air." The short-faced race did not exist at this period, as Willughby could not have overlooked birds so remarkable for their small size and short beaks. We can even trace some of the steps by which this race has been produced. Moore in 1735 enumerates correctly the chief points of excellence, but does not give any description of the several sub-breeds; and from this fact Mr. Eaton infers [41] that the Short-faced Tumbler had not then come to full perfection. Moore even speaks of the Jacobin as being the smallest pigeon. Thirty years afterwards, in 1765, in the Treatise dedicated to Mayor, short-faced Almond Tumblers are fully described, but the author, an excellent fancier, expressly states in his Preface (p. xiv.) that, "from great care and expense in breeding them, they have arrived to so great perfection and are so different from what they were 20 or 30 years past, that an old fancier would have condemned

[40] 'L'Histoire de la Nature des Oiseaux,' p. 314.

[41] 'Treatise on Pigeons,' 1852, p. 64.

them for no other reason than because they are not like what used to be thought good when he was in the fancy before." Hence it would appear that there was a rather sudden change in the character of the short-faced Tumbler at about this period; and there is reason to suspect that a dwarfed and half-monstrous bird, the parent-form of the several short-faced sub-breeds, then appeared. I suspect this because short-faced Tumblers are born with their beaks (ascertained by careful measurement) as short, proportionally with the size of their bodies, as in the adult bird; and in this respect they differ greatly from all other breeds, which slowly acquire during growth their various characteristic qualities.

Since the year 1765 there has been some change in one of the chief characters of the short-faced Tumbler, namely, in the length of the beak. Fanciers measure the "head and beak" from the tip of the beak to the front corner of the eyeball. About the year 1765 a "head and beak" was considered good,[42] which, measured in the usual manner, was $\frac{7}{8}$ of an inch in length; now it ought not to exceed $\frac{5}{8}$ of an inch; "it is however possible," as Mr. Eaton candidly confesses, "for a bird to be considered as pleasant or neat even at $\frac{6}{8}$ of an inch, but exceeding that length it must be looked upon as unworthy of attention." Mr. Eaton states that he has never seen in the course of his life more than two or three birds with the "head and beak" not exceeding half an inch in length; "still I believe in the course of a few years that the head and beak will be shortened, and that half-inch birds will not be considered so great a curiosity as at the present time." That Mr. Eaton's opinion deserves attention cannot be doubted, considering his success in winning prizes at our exhibitions. Finally in regard to the Tumbler it may be concluded from the facts above given that it was originally introduced into Europe, probably first into England, from the East; and that it then resembled our common English Tumbler, or more probably the Persian or Indian Tumbler, with a beak only just perceptibly shorter than that of the common dovecot-pigeon. With respect to the short-faced Tumbler, which is not known to exist in the East, there can hardly be a doubt that the whole wonderful change in the size of the head, beak, body and feet, and in general carriage, has been produced during the last two centuries by continued selection, aided probably by the birth of a semi-monstrous bird somewhere about the year 1750.

Runts.—Of their history little can be said. In the time of Pliny the pigeons of Campania were the largest known; and from this fact alone some authors assert that they were Runts. In Aldrovandi's time, in 1600, two sub-breeds existed; but one of them, the short-beaked, is now extinct in Europe.

Barbs.—Notwithstanding statements to the contrary, it seems to me impossible to recognise the Barb in Aldrovandi's description and

[42] J. M. Eaton's 'Treatise on the Breeding and Managing of the Almond Tumbler,' 1851. Compare p. v. of Preface, p. 9, and p. 32.

figures; four breeds, however, existed in the year 1600 which evidently were allied both to Barbs and Carriers. To show how difficult it is to recognise some of the breeds described by Aldrovandi I will give the different opinions in regard to the above four kinds, named by him *C. indica, cretensis, gutturosa,* and *persica*. Willughby, thought that the *Columba indica* was a Turbit, but the eminent fancier Mr. Brent believes that it was an inferior Barb: *C. cretensis*, with a short beak and a swelling on the upper mandible, cannot be recognised: *C.* (falsely called) *gutturosa*, which from its *rostrum, breve, crassum, et tuberosum* seems to me to come nearest to the Barb, Mr. Brent believes to be a Carrier; and lastly, the *C. persica et turcica*, Mr. Brent thinks, and I quite concur with him, was a short-beaked Carrier with very little wattle. In 1687 the Barb was known in England, and Willughby describes the beak as like that of the Turbit; but it is not credible that his Barbs should have had a beak like that of our present birds, for so accurate an observer could not have overlooked its great breadth.

English Carrier.—We may look in vain in Aldrovandi's work for any bird resembling our prize Carriers; the *C. persica et turcica* of this author comes the nearest, but is said to have had a short thick beak; therefore it must have approached in character a Barb, and have differed greatly from our Carriers. In Willughby's time, in 1677, we can clearly recognise the Carrier, yet he adds, "the bill is not short, but of a moderate length;" a description which no one would apply to our present Carriers, so conspicuous for the extraordinary length of their beaks. The old names given in Europe to the Carrier, and the several names now in use in India, indicate that Carriers originally came from Persia; and Willughby's description would perfectly apply to the Bussorah Carrier as it now exists in Madras. In later times we can partially trace the progress of change in our English Carriers: Moore, in 1735, says "an inch and a half is reckoned a long beak, though there are very good Carriers that are found not to exceed an inch and a quarter." These birds must have resembled or perhaps been a little superior to the Carriers, previously described, now found in Persia. In England at the present day "there are," as Mr. Eaton[43] states, "beaks that would measure (from edge of eye to tip of beak) one inch and three-quarters, and some few even two inches in length."

From these historical details we see that nearly all the chief domestic races existed before the year 1600. Some remarkable only for colour appear to have been identical with our present breeds, some were nearly the same, some considerably different, and some have since become extinct. Several breeds, such as Finnikins and Turners, the swallow-tailed pigeon of Bechstein and the Carmelite, seem to have

[43] 'Treatise on Pigeons,' 1852, p. 41.

originated and to have disappeared within this same period. Any one now visiting a well-stocked English aviary would certainly pick out as the most distinct kinds, the massive Runt, the Carrier with its wonderfully elongated beak and great wattles, the Barb with its short broad beak and eye-wattles, the short-faced Tumbler with its small conical beak, the Pouter with its great crop, long legs and body, the Fantail with its upraised, widely-expanded, well-feathered tail, the Turbit with its frill and short blunt beak, and the Jacobin with his hood. Now, if this same person could have viewed the pigeons kept before 1600 by Akber Khan in India and by Aldrovandi in Europe, he would have seen the Jacobin with a less perfect hood; the Turbit apparently without its frill; the Pouter with shorter legs, and in every way less remarkable—that is, if Aldrovandi's Pouter resembled the old German kind; the Fantail would have been far less singular in appearance, and would have had much fewer feathers in its tail; he would have seen excellent flying Tumblers, but he would in vain have looked for the marvellous short-faced breeds; he would have seen birds allied to Barbs, but it is extremely doubtful whether he would have met with our actual Barbs; and lastly, he would have found Carriers with beaks and wattle incomparably less developed than in our English Carriers. He might have classed most of the breeds in the same groups as at present; but the differences between the groups were then far less strongly pronounced than at present. In short, the several breeds had at this early period not diverged in so great a degree as now from their aboriginal common parent, the wild rock-pigeon.

Manner of Formation of the chief Races.

We will now consider more closely the probable steps by which the chief races have been formed. As long as pigeons are kept semi-domesticated in dovecots in their native country, without any care in selecting and matching them, they are liable to little more variation than the wild *C. livia*, namely, in the wings becoming chequered with black, in the croup being blue or white, and in the size of the body. When, however, dovecot-pigeons are transported into diversified

countries, such as Sierra Leone, the Malay archipelago, and Madeira, they are exposed to new conditions of life; and apparently in consequence vary in a somewhat greater degree. When closely confined, either for the pleasure of watching them, or to prevent their straying, they must be exposed, even in their native climate, to considerably different conditions; for they cannot obtain their natural diversity of food; and, what is probably more important, they are abundantly fed, whilst debarred from taking much exercise. Under these circumstances we might expect to find, from the analogy of all other domesticated animals, a greater amount of individual variability than with the wild pigeon; and this is the case. The want of exercise apparently tends to reduce the size of the feet and organs of flight; and then, from the law of correlation of growth, the beak apparently becomes affected. From what we now see occasionally taking place in our aviaries, we may conclude that sudden variations or sports, such as the appearance of a crest of feathers on the head, of feathered feet, of a new shade of colour, of an additional feather in the tail or wing, would occur at rare intervals during the many centuries which have elapsed since the pigeon was first domesticated. At the present day such "sports" are generally rejected as blemishes; and there is so much mystery in the breeding of pigeons that, if a valuable sport did occur, its history would often be concealed. Before the last hundred and fifty years, there is hardly a chance of the history of any such sport having been recorded. But it by no means follows from this that such sports in former times, when the pigeon had undergone much less variation, would have been rejected. We are profoundly ignorant of the cause of each sudden and apparently spontaneous variation, as well as of the infinitely numerous shades of difference between the birds of the same family. But in a future chapter we shall see that all such variations appear to be the indirect result of changes of some kind in the conditions of life.

Hence, after a long course of domestication, we might expect to see in the pigeon much individual variability, and occasional sudden variations, as well as slight modifications from the lessened use of certain parts, together with the

effects of correlation of growth. But without selection all this would produce only a trifling or no result; for without such aid differences of all kinds would, from the two following causes, soon disappear. In a healthy and vigorous lot of pigeons many more young birds are killed for food or die than are reared to maturity; so that an individual having any peculiar character, if not selected, would run a good chance of being destroyed; and if not destroyed, the peculiarity in question would generally be obliterated by free intercrossing. It might, however, occasionally happen that the same variation repeatedly occurred, owing to the action of peculiar and uniform conditions of life, and in this case it would prevail independently of selection. But when selection is brought into play all is changed; for this is the foundation-stone in the formation of new races; and with the pigeon, circumstances, as we have already seen, are eminently favourable for selection. When a bird presenting some conspicuous variation has been preserved, and its offspring have been selected, carefully matched, and again propagated, and so onwards during successive generations, the principle is so obvious that nothing more need be said about it. This may be called *methodical selection*, for the breeder has a distinct object in view, namely, to preserve some character which has actually appeared; or to create some improvement already pictured in his mind.

Another form of selection has hardly been noticed by those authors who have discussed this subject, but is even more important. This form may be called *unconscious selection*, for the breeder selects his birds unconsciously, unintentionally, and without method, yet he surely though slowly produces a great result. I refer to the effects which follow from each fancier at first procuring and afterwards rearing as good birds as he can, according to his skill, and according to the standard of excellence at each successive period. He does not wish permanently to modify the breed; he does not look to the distant future, or speculate on the final result of the slow accumulation during many generations of successive slight changes; he is content if he possesses a good stock, and more than content if he can beat his rivals. The fancier in the

time of Aldrovandi, when in the year 1600 he admired his own Jacobins, Pouters, or Carriers, never reflected what their descendants in the year 1860 would become: he would have been astonished could he have seen our Jacobins, our improved English Carriers, and our Pouters; he would probably have denied that they were the descendants of his own once-admired stock, and he would perhaps not have valued them, for no other reason, as was written in 1765, "than because they were not like what used to be thought good when he was in the fancy." No one will attribute the lengthened beak of the Carrier, the shortened beak of the Short-faced Tumbler, the lengthened leg of the Pouter, the more perfectly enclosed hood of the Jacobin, &c.,—changes effected since the time of Aldrovandi, or even since a much later period,—to the direct and immediate action of the conditions of life. For these several races have been modified in various and even in directly opposite ways, though kept under the same climate and treated in all respects in as nearly uniform a manner as possible. Each slight change in the length or shortness of the beak, in the length of leg, &c., has no doubt been indirectly and remotely caused by some change in the conditions to which the bird has been subjected, but we must attribute the final result, as is manifest in those cases of which we have any historical record, to the continued selection and accumulation of many slight successive variations.

The action of unconscious selection, as far as pigeons are concerned, depends on a universal principle in human nature, namely, on our rivalry, and desire to outdo our neighbours. We see this in every fleeting fashion, even in our dress, and it leads the fancier to endeavour to exaggerate every peculiarity in his breeds. A great authority on pigeons,[44] says, "Fanciers do not and will not admire a medium standard, that is, half and half, which is neither here nor there, but admire extremes." After remarking that the fancier of Short-faced Beard Tumblers wishes for a very short beak, and that the fancier of Long-faced Beard Tumblers wishes for a very

[44] Eaton's 'Treatise on Pigeons,' 1858, p. 86.

long beak, he says, with respect to one of intermediate length, "Don't deceive yourself. Do you suppose for a moment the short or the long-faced fancier would accept such a bird as a gift? Certainly not; the short-faced fancier could see no beauty in it; the long-faced fancier would swear there was no use in it, &c." In these comical passages, written seriously, we see the principle which has ever guided fanciers, and has led to such great modifications in all the domestic races which are valued solely for their beauty or curiosity.

Fashions in pigeon-breeding endure for long periods; we cannot change the structure of a bird as quickly as we can the fashion of our dress. In the time of Aldrovandi, no doubt the more the pouter inflated his crop, the more he was valued. Nevertheless, fashions do to a certain extent change; first one point of structure and then another is attended to; or different breeds are admired at different times and in different countries. As the author just quoted remarks, "the fancy ebbs and flows; a thorough fancier now-a-days never stoops to breed toy-birds;" yet these very "toys" are now most carefully bred in Germany. Breeds which at the present time are highly valued in India are considered worthless in England. No doubt, when breeds are neglected, they degenerate; still we may believe that, as long as they are kept under the same conditions of life, characters once gained will be partially retained for a long time, and may form the starting-point for a future course of selection.

Let it not be objected to this view of the action of unconscious selection that fanciers would not observe or care for extremely slight differences. Those alone who have associated with fanciers can be thoroughly aware of their accurate powers of discrimination acquired by long practice, and of the care and labour which they bestow on their birds. I have known a fancier deliberately study his birds day after day to settle which to match together and which to reject. Observe how difficult the subject appears to one of the most eminent and experienced fanciers. Mr. Eaton, the winner of many prizes, says, "I would here particularly guard you against keeping too great a variety of pigeons, otherwise you will know a little about all the kinds, but nothing about one as it

ought to be known." "It is possible there may be a few fanciers that have a good general knowledge of the several fancy pigeons, but there are many who labour under the delusion of supposing they know what they do not." Speaking exclusively of one sub-variety of one race, namely, the short-faced almond tumbler, and after saying that some fanciers sacrifice every property to obtain a good head and beak, and that other fanciers sacrifice everything for plumage, he remarks: "Some young fanciers who are over covetous go in for all the five properties at once, and they have their reward by getting nothing." In India, as I hear from Mr. Blyth, pigeons are likewise selected and matched with the greatest care. We must not judge of the slight divergences from existing varieties which would have been valued in ancient days, by those which are now valued after the formation of so many races, each with its own standard of perfection, kept uniform by our numerous Exhibitions. The ambition of the most energetic fancier may be fully satisfied by the difficulty of excelling other fanciers in the breeds already established, without trying to form a new one.

A difficulty with respect to the power of selection will perhaps already have occurred to the reader, namely, what could have led fanciers first to attempt to make such singular breeds as Pouters, Fantails, Carriers, &c.? But it is this very difficulty which the principle of unconscious selection removes. Undoubtedly no fancier ever did intentionally make such an attempt. All that we need suppose is that a variation occurred sufficiently marked to catch the discriminating eye of some ancient fancier, and then unconscious selection carried on for many generations, that is, the wish of succeeding fanciers to excel their rivals, would do the rest. In the case of the Fantail we may suppose that the first progenitor of the breed had a tail only slightly erected, as may now be seen in certain Runts,[45] with some increase in the number of the tail-feathers, as now occasionally occurs with Nuns. In the case of the Pouter we may suppose that

[45] *See* Neumeister's figure of the Florence Runt, tab. 13, in 'Das Ganze der Taubenzucht.'

some bird inflated its crop a little more than other pigeons, as is now the case in a slight degree with the œsophagus of the Turbit. We do not know the origin of the common Tumbler, but we may suppose that a bird was born with some affection of the brain, leading it to make somersaults in the air;[46] and before the year 1600 pigeons remarkable for their diversified manner of flight were much valued in India, and by the order of the Emperor Akber Khan were sedulously trained and carefully matched.

In the foregoing cases we have supposed that a sudden variation, conspicuous enough to catch a fancier's eye, first appeared; but even this degree of abruptness in the process of variation is not necessary for the formation of a new breed. When the same kind of pigeon has been kept pure, and has been bred during a long period by two or more fanciers, slight differences in the strain can often be recognized. Thus I have seen first-rate Jacobins in one man's possession which certainly differed slightly in several characters from those kept by another. I possessed some excellent Barbs descended from a pair which had won a prize, and another lot descended from a stock formerly kept by that famous fancier Sir John Sebright, and these plainly differed in the form of the beak; but the differences were so slight that they could hardly be given by words. Again, the common English and Dutch Tumbler differ in a somewhat greater degree, both in length of beak and shape of head. What first caused these slight differences cannot be explained any more than why one man has a long nose and another a short one. In the strains long kept distinct by different fanciers, such differences are so common that they cannot be accounted for by the accident of the birds first chosen for breeding having been originally as different as they now are. The explanation no doubt lies in selection of a slightly different nature having been applied in each case; for no

[46] Mr. W. J. Moore gives a full account of the Ground Tumblers of India ('Indian Medical Gazette,' Jan. and Feb. 1873), and says the pricking the base of the brain, and giving hydrocyanic acid, together with strychnine, to an ordinary pigeon, brings on convulsive movements exactly like those of a Tumbler. One pigeon, the brain of which had been pricked, completely recovered, and ever afterwards occasionally made somersaults.

two fanciers have exactly the same taste, and consequently no two, in choosing and carefully matching their birds, prefer or select exactly the same. As each man naturally admires his own birds, he goes on continually exaggerating by selection whatever slight peculiarities they may possess. This will more especially happen with fanciers living in different countries, who do not compare their stocks or aim at a common standard of perfection. Thus, when a mere strain has once been formed, unconscious selection steadily tends to augment the amount of difference, and thus converts the strain into a sub-breed and this ultimately into a well-marked breed or race.

The principle of correlation of growth should never be lost sight of. Most pigeons have small feet, apparently caused by their lessened use, and from correlation, as it would appear, their beaks have likewise become reduced in length. The beak is a conspicuous organ, and, as soon as it had thus become perceptibly shortened, fanciers would almost certainly strive to reduce it still more by the continued selection of birds with the shortest beaks; whilst at the same time other fanciers, as we know has actually been the case, would in other sub-breeds, strive to increase its length. With the increased length of the beak, the tongue becomes greatly lengthened, as do the eyelids with the increased development of the eye-wattles; with the reduced or increased size of the feet, the number of the scutellæ vary; with the length of the wing, the number of the primary wing-feathers differ; and with the increased length of the body in the pouter the number of the sacral vertebræ is augmented. These important and correlated differences of structure do not invariably characterise any breed; but if they had been attended to and selected with as much care as the more conspicuous external differences, there can hardly be a doubt that they would have been rendered constant. Fanciers could assuredly have made a race of Tumblers with nine instead of ten primary wing-feathers, seeing how often the number nine appears without any wish on their part, and indeed in the case of the white-winged varieties in opposition to their wish. In a similar manner, if the vertebræ had

been visible and had been attended to by fanciers, assuredly an additional number might easily have been fixed in the Pouter. If these latter characters had once been rendered constant, we should never have suspected that they had at first been highly variable, or that they had arisen from correlation, in the one case with the shortness of the wings, and in the other case with the length of the body.

In order to understand how the chief domestic races have become distinctly separated from each other, it is important to bear in mind, that fanciers constantly try to breed from the best birds, and consequently that those which are inferior in the requisite qualities are in each generation neglected; so that after a time the less improved parent-stocks and many subsequently formed intermediate grades become extinct. This has occurred in the case of the Pouter, Turbit, and Trumpeter, for these highly improved breeds are now left without any links closely connecting them either with each other or with the aboriginal rock-pigeon. In other countries, indeed, where the same care has not been applied, or where the same fashion has not prevailed, the earlier forms may long remain unaltered, or altered only in a slight degree, and we are thus sometimes enabled to recover the connecting links. This is the case in Persia and India with the Tumbler and Carrier, which there differ but slightly from the rock-pigeon in the proportions of their beaks. So again in Java, the Fantail sometimes has only fourteen caudal feathers, and the tail is much less elevated and expanded than in our improved birds; so that the Java bird forms a link between a first-rate Fantail and the rock-pigeon.

Occasionally a breed may be retained for some particular quality in a nearly unaltered condition in the same country, together with highly modified off-shoots or sub-breeds, which are valued for some distinct property. We see this exemplified in England, where the common Tumbler, which is valued only for its flight, does not differ much from its parent-form, the Eastern Tumbler; whereas the Short-faced Tumbler has been prodigiously modified, from being valued, not for its flight, but for other qualities. But the common-flying Tumbler of Europe has already begun to branch out

into slightly different sub-breeds, such as the common English Tumbler, the Dutch Roller, the Glasgow House-tumbler, and the Long-faced Beard Tumbler, &c.; and in the course of centuries, unless fashions greatly change, these sub-breeds will diverge through the slow and insensible process of unconscious selection, and become modified, in a greater and greater degree. After a time the perfectly graduated links which now connect all these sub-breeds together, will be lost, for there would be no object and much difficulty in retaining such a host of intermediate sub-varieties.

The principle of divergence, together with the extinction of the many previously existing intermediate forms, is so important for understanding the origin of domestic races, as well as of species in a state of nature, that I will enlarge a little more on this subject. Our third main group includes Carriers, Barbs, and Runts, which are plainly related to one another, yet wonderfully distinct in several important characters. According to the view given in the last chapter, these three races have probably descended from an unknown race having an intermediate character, and this race from the rock-pigeon. Their characteristic differences are believed to be due to different breeders having at an early period admired different points of structure; and then, on the acknowledged principle of admiring extremes, having gone on breeding, without any thought of the future, as good birds as they could,—Carrier-fanciers preferring long beaks with much wattle,—Barb-fanciers preferring short thick beaks with much eye-wattle,—and Runt-fanciers not caring about the beak or wattle, but only for the size and weight of the body. This process would have led to the neglect and final extinction of the earlier, inferior, and intermediate birds; and thus it has come to pass, that in Europe these three races are now so extraordinarily distinct from each other. But in the East, whence they were originally brought, the fashion has been different, and we there see breeds which connect the highly modified English Carrier with the rock-pigeon, and others which to a certain extent connect Carriers and Runts. Looking back to the time of Aldrovandi, we find that there existed in Europe, before the year 1600, four breeds which

were closely allied to Carriers and Barbs, but which competent authorities cannot now identify with our present Barbs and Carriers; nor can Aldrovandi's Runts be identified with our present Runts. These four breeds certainly did not differ from each other nearly so much as do our existing English Carriers, Barbs, and Runts. All this is exactly what might have been anticipated. If we could collect all the pigeons which have ever lived, from before the time of the Romans to the present day, we should be able to group them in several lines, diverging from the parent rock-pigeon. Each line would consist of almost insensible steps, occasionally broken by some slightly greater variation or sport, and each would culminate in one of our present highly modified forms. Of the many former connecting links, some would be found to have become absolutely extinct without having left any issue, whilst others, though extinct, would be recognized as the progenitors of the existing races.

I have heard it remarked as a strange circumstance that we occasionally hear of the local or complete extinction of domestic races, whilst we hear nothing of their origin. How, it has been asked, can these losses be compensated, and more than compensated, for we know that with almost all domesticated animals the races have largely increased in number since the time of the Romans? But on the view here given, we can understand this apparent contradiction. The extinction of a race within historical times is an event likely to be noticed; but its gradual and scarcely sensible modification through unconscious selection, and its subsequent divergence, either in the same or more commonly in distant countries, into two or more strains, and their gradual conversion into sub-breeds, and these into well-marked breeds are events which would rarely be noticed. The death of a tree, that has attained gigantic dimensions, is recorded; the slow growth of smaller trees and their increase in number excite no attention.

In accordance with the belief in the great power of selection, and of the little direct power of changed conditions of life, except in causing general variability or plasticity of organisation, it is not surprising that dovecot-pigeons have remained

unaltered from time immemorial; and that some toy-pigeons, which differ in little else besides colour from the dovecot-pigeon, have retained the same character for several centuries. For when one of these toy-pigeons had once become beautifully and symmetrically coloured,—when, for instance, a Spot had been produced with the crown of its head, its tail, and tail-coverts of a uniform colour, the rest of the body being snow-white,—no alteration or improvement would be desired. On the other hand, it is not surprising that during this same interval of time our highly-bred pigeons have undergone an astonishing amount of change; for in regard to them there is no defined limit to the wish of the fancier, and there is no known limit to the variability of their characters. What is there to stop the fancier desiring to give to his Carrier a longer and longer beak, or to his Tumbler a shorter and shorter beak? nor has the extreme limit of variability in the beak, if there be any such limit, as yet been reached. Notwithstanding the great improvement effected within recent times in the Short-faced Almond Tumbler, Mr. Eaton remarks, "the field is still as open for fresh competitors as it was one hundred years ago;" but this is perhaps an exaggerated assertion, for the young of all highly-improved fancy birds are extremely liable to disease and death.

I have heard it objected that the formation of the several domestic races of the pigeon throws no light on the origin of the wild species of the Columbidæ, because their differences are not of the same nature. The domestic races, for instance do not differ, or differ hardly at all, in the relative lengths and shape of the primary wing-feathers, in the relative length of the hind toe, or in habits of life, as in roosting and building in trees. But the above objection shows how completely the principle of selection has been misunderstood. It is not likely that characters selected by the caprice of man should resemble differences preserved under natural conditions either from being of direct service to each species, or from standing in correlation with other modified and serviceable structures. Until man selects birds differing in the relative length of the wing-feathers or toes, &c., no sensible change in these parts should be expected. Nor could man do anything

unless these parts happened to vary under domestication: I do not positively assert that this is the case, although I have seen traces of such variability in the wing-feathers, and certainly in the tail-feathers. It would be a strange fact if the relative length of the hind toe should never vary, seeing how variable the foot is both in size and in the number of the scutellæ. With respect to the domestic races not roosting or building in trees, it is obvious that fanciers would never attend to or select such changes in habits; but we have seen that the pigeons in Egypt, which do not for some reason like settling on the low mud hovels of the natives, are led, apparently by compulsion, to perch in crowds on the trees. We may even affirm that, if our domestic races had become greatly modified in any of the above specified respects, and it could be shown that fanciers had never attended to such points, or that they did not stand in correlation with other selected characters, the fact, on the principles advocated in this chapter, would have offered a serious difficulty.

Let us briefly sum up the last two chapters on the pigeon. We may conclude with confidence that all the domestic races, notwithstanding their great amount of difference, are descended from the *Columba livia*, including under this name certain wild races. But the differences between the latter throw no light whatever on the characters which distinguish the domestic races. In each breed or sub-breed the individual birds are more variable than birds in a state of nature; and occasionally they vary in a sudden and strongly-marked manner. This plasticity of organization apparently results from changed conditions of life. Disuse has reduced certain parts of the body. Correlation of growth so ties the organisation together, that when one part varies other parts vary at the same time. When several breeds have once been formed, their intercrossing aids the progress of modification, and has even produced new sub-breeds. But as, in the construction of a building, mere stones or bricks are of little avail without the builder's art, so, in the production of new races, selection has been the presiding power. Fanciers can act by selection on excessively slight individual differences, as well as on those greater differences which are called sports. Selection

is followed methodically when the fancier tries to improve and modify a breed according to a prefixed standard of excellence; or he acts unmethodically and unconsciously, by merely trying to rear as good birds as he can, without any wish or intention to alter the breed. The progress of selection almost inevitably leads to the neglect and ultimate extinction of the earlier and less improved forms, as well as of many intermediate links in each long line of descent. Thus it has come to pass that most of our present races are so marvellously distinct from each other, and from the aboriginal rock-pigeon.