

SECONDARY SEXUAL CHARACTERS OF BIRDS.

SECONDARY sexual characters are more diversified and conspicuous in birds, though not perhaps entailing more important changes of structure, than in any other class of animals. I shall, therefore, treat the subject at considerable length. Male birds sometimes, though rarely, possess special weapons for fighting with each other. They charm the female by vocal or instrumental music of the most varied kinds. They are ornamented by all sorts of combs, wattles, protuberances, horns, air-distended sacks, top-knots, naked shafts, plumes and lengthened feathers gracefully springing from all parts of the body. The beak and naked skin about the head, and the feathers, are often gorgeously coloured. The males sometimes pay their court by dancing, or by fantastic antics performed either on the ground or in the air. In one instance, at least, the male emits a musky odour, which we may suppose serves to charm or excite the female; for that excellent observer, Mr. Ramsay,* says of the Australian musk-duck (*Biziura lobata*) that "the smell which the male emits during the summer months is confined to that sex, and in some individuals is retained throughout the year; I have never, even in the breeding-season, shot a female which had any smell of musk." So powerful is this odour during the pairing-season, that it can be detected long before the bird can be seen.*(2) On the whole, birds appear to be the most aesthetic of all animals, excepting of course man, and they have nearly the same taste for the beautiful as we have. This is shown by our enjoyment of the singing of birds, and by our women, both civilised and savage, decking their heads with borrowed plumes, and using gems which are hardly more brilliantly coloured than the naked skin and wattles of certain birds. In man, however, when cultivated, the sense of beauty is manifestly a far more complex feeling, and is associated with various intellectual ideas.

* Ibis., vol. iii. (new series), 1867, p. 414.

*(2) Gould, Handbook of the Birds of Australia, 1865, vol. ii., p. 383.

Before treating of the sexual characters with which we are here more particularly concerned, I may just allude to certain differences between the sexes which apparently depend on differences in their habits of life; for such cases, though common in the lower, are rare in the higher classes. Two humming-birds belonging to the genus *Eustephanus*, which inhabit the island of Juan Fernandez, were long thought to be specifically distinct, but are now known, as Mr. Gould informs me, to be the male and female of the same species, and they differ slightly in the form of the beak. In another genus of humming-birds (*Grypus*), the beak of the male is serrated along the margin and hooked at the extremity, thus differing much from that of the female. In the *Neomorpha* of New Zealand, there is, as we have seen, a still wider difference in the form of the beak in relation to the manner of feeding of the two sexes. Something of the same kind has been observed with the goldfinch (*Carduelis elegans*), for I am assured by Mr. J. Jenner Weir that the bird-catchers can distinguish the males by their slightly longer beaks. The flocks of males are often found feeding on the seeds of the teasle (*Dipsacus*), which they can reach with their elongated beaks, whilst the females more commonly feed on the seeds of the betony or *Scrophularia*. With a slight difference of this kind as a foundation, we can see how the beaks of the two sexes might be made to differ greatly through natural selection. In some of the above cases, however, it is possible that the beaks of the males may have been first modified in relation to their contests with other males; and that this afterwards led to slightly changed habits of life.

Law of Battle.- Almost all male birds are extremely pugnacious, using their beaks, wings, and legs for fighting together. We see this every spring with our robins and sparrows. The smallest of all birds, namely the humming-bird, is one of the most quarrelsome. Mr. Gosse* describes a battle in which a pair seized hold of each other's beaks, and whirled round and round, till they almost fell to the ground; and M. Montes de Oca, in speaking of another genus of humming-bird, says that two males rarely meet without a fierce aerial encounter: when kept in cages "their fighting has mostly ended in the splitting of the tongue of one of the two, which then surely dies from being unable to feed."*(2) With waders, the males of the common water-hen (*Gallinula chloropus*) "when pairing, fight violently for the females: they stand nearly upright in the water and strike with their feet." Two were seen to be thus engaged for half an hour, until one got hold of the head of the other, which would have been killed had not the observer interfered; the female all the time looking on as a quiet spectator.*(3) Mr. Blyth informs me that the males of an allied bird (*Gallicrex cristatus*) are a third larger than the females, and are so pugnacious during the breeding-season that they are kept by the natives of eastern Bengal for the sake of fighting. Various other birds are kept in India for the same purpose, for instance, the bulbuls (*Pycnonotus hoemorrhous*) which "fight with great spirit."*(4)

* Quoted by Mr. Gould, Introduction to the Trochilidae, 1861, page 29.

*(2) Gould, *ibid.*, p. 52.

*(3) W. Thompson, Natural History of Ireland: Birds, vol. ii., 1850, p. 327.

*(4) Jerdon, Birds of India, 1863, vol. ii., p. 96.

The polygamous ruff (see *Machetes pugnax*, fig. 37) is notorious for his extreme pugnacity; and in the spring, the males, which are considerably larger than the females, congregate day after day at a particular spot, where the females propose to lay their eggs. The fowlers discover these spots by the turf being trampled somewhat bare. Here they fight very much like game-cocks, seizing each other with their beaks and striking with their wings. The great ruff of feathers round the neck is then erected, and according to Col. Montagu "sweeps the ground as a shield to defend the more tender parts"; and this is the only instance known to me in the case of birds of any structure serving as a shield. The ruff of feathers, however, from its varied and rich colours probably serves in chief part as an ornament. Like most pugnacious birds, they seem always ready to fight, and when closely confined, often kill each other; but Montagu observed that their pugnacity becomes greater during the spring, when the long feathers on their necks are fully developed; and at this period the least movement by any one bird provokes a general battle.* Of the pugnacity of web-footed birds, two instances will suffice: in Guiana "bloody fights occur during the breeding-season between the males of the wild musk-duck (*Cairina moschata*); and where these fights have occurred the river is covered for some distance with feathers."*(2) Birds which seem ill-adapted for fighting engage in fierce conflicts; thus the stronger males of the pelican drive away the weaker ones, snapping with their huge beaks and giving heavy blows with their wings. Male snipe fight together, "tugging and pushing each other with their bills in the most curious manner imaginable." Some few birds are believed never to fight; this is the case, according to Audubon, with one of the woodpeckers of the United States (*Picus sauratus*), although "the hens are followed by even half a dozen of their gay suitors."*(3)

* Macgillivray, History of British Birds, vol. iv., 1852, pp. 177-181.

*(2) Sir R. Schomburgk, in Journal of Royal Geographic Society, vol.

xiii., 1843, p. 31.

* (3) Ornithological Biography, vol. i., p. 191. For pelicans and snipes, see vol. iii., pp. 138, 477.

The males of many birds are larger than the females, and this no doubt is the result of the advantage gained by the larger and stronger males over their rivals during many generations. The difference in size between the two sexes is carried to an extreme point in several Australian species; thus the male musk-duck (*Biziura*), and the male *Cincloramphus cruralis* (allied to our pipits) are by measurement actually twice as large as their respective females.* With many other birds the females are larger than the males; and, as formerly remarked, the explanation often given, namely, that the females have most of the work in feeding their young, will not suffice. In some few cases, as we shall hereafter see, the females apparently have acquired their greater size and strength for the sake of conquering other females and obtaining possession of the males.

* Gould, Handbook of Birds of Australia, vol. i., p. 395; vol. ii., p. 383.

The males of many gallinaceous birds, especially of the polygamous kinds, are furnished with special weapons for fighting with their rivals, namely spurs, which can be used with fearful effect. It has been recorded by a trustworthy writer* that in Derbyshire a kite struck at a game-hen accompanied by her chickens, when the cock rushed to the rescue, and drove his spur right through the eye and skull of the aggressor. The spur was with difficulty drawn from the skull, and as the kite, though dead, retained his grasp, the two birds were firmly locked together; but the cock when disentangled was very little injured. The invincible courage of the game-cock is notorious: a gentleman who long ago witnessed the brutal scene, told me that a bird had both its legs broken by some accident in the cockpit, and the owner laid a wager that if the legs could be spliced so that the bird could stand upright, he would continue fighting. This was effected on the spot, and the bird fought with undaunted courage until he received his death-stroke. In Ceylon a closely allied, wild species, the *Gallus stanleyi*, is known to fight desperately "in defence of his seraglio," so that one of the combatants is frequently found dead.* (2) An Indian partridge (*Ortygornis gularis*), the male of which is furnished with strong and sharp spurs, is so quarrelsome "that the scars of former fights disfigure the breast of almost every bird you kill."* (3)

* Mr. Hewitt, in the Poultry Book, by Tegetmeier, 1866, p. 137.

* (2) Layard, Annals and Magazine of Natural History, vol. xiv., 1854, p. 63.

* (3) Jerdon, Birds of India, vol. iii., p. 574.

The males of almost all gallinaceous birds, even those which are not furnished with spurs, engage during the breeding-season in fierce conflicts. The capercailzie and black-cock (*Tetrao urogallus* and *T. tetrix*), which are both polygamists, have regular appointed places, where during many weeks they congregate in numbers to fight together and to display their charms before the females. Dr. W. Kowalevsky informs me that in Russia he has seen the snow all bloody on the arenas where the capercailzie have fought; and the black-cocks "make the feathers fly in every direction," when several "engage in a battle royal." The elder Brehm gives a curious account of the balz, as the love-dances and love songs of the black-cock are called in Germany. The bird utters almost continuously the strangest noises: "he holds his tail up and spreads it out like a fan, he lifts up his head and neck with all the feathers erect, and stretches his wings from the body. Then he takes a few jumps in different directions sometimes in a circle, and presses the under part of his beak so hard against the

ground that the chin feathers are rubbed off. During these movements he beats his wings and turns round and round. The more ardent he grows the more lively he becomes, until at last the bird appears like a frantic creature." At such times the black-cocks are so absorbed that they become almost blind and deaf, but less so than the capercaillie: hence bird after bird may be shot on the same spot, or even caught by the hand. After performing these antics the males begin to fight: and the same black-cock, in order to prove his strength over several antagonists, will visit in the course of one morning several balz places, which remain the same during successive years.*

* Brehm, Illust. Thierleben, 1867, B. iv., s. 351. Some of the foregoing statements are taken from L. Lloyd, Game Birds of Sweden, &c., 1867, p. 79.

The peacock with his long train appears more like a dandy than a warrior, but he sometimes engages in fierce contests: the Rev. W. Darwin Fox informs me that at some little distance from Chester two peacocks became so excited whilst fighting, that they flew over the whole city, still engaged, until they alighted on the top of St. John's tower.

The spur, in those gallinaceous birds which are thus provided, is generally single; but *Polyplectron* (see fig. 51) has two or more on each leg; and one of the blood-pheasants (*Ithaginis cruentus*) has been seen with five spurs. The spurs are generally confined to the male, being represented by mere knobs or rudiments in the female; but the females of the Java peacock (*Pavo muticus*) and, as I am informed by Mr. Blyth, of the small fire-backed pheasant (*Euplocamus erythrophthalmus*) possess spurs. In *Galloperdix* it is usual for the males to have two spurs, and for the females to have only one on each leg.* Hence spurs may be considered as a masculine structure, which has been occasionally more or less transferred to the females. Like most other secondary sexual characters, the spurs are highly variable, both in number and development, in the same species.

* Jerdon, Birds of India: on *Ithaginis*, vol. iii., p. 523; on *Galloperdix*, p. 541.

Various birds have spurs on their wings. But the Egyptian goose (*Chenalopex aegyptiacus*) has only "bare obtuse knobs," and these probably shew us the first steps by which true spurs have been developed in other species. In the spur-winged goose, *Plectropterus gambensis*, the males have much larger spurs than the females; and they use them, as I am informed by Mr. Bartlett, in fighting together, so that, in this case, the wing-spurs serve as sexual weapons; but according to Livingstone, they are chiefly used in the defence of the young. The *Palamedea* (see fig. 38) is armed with a pair of spurs on each wing; and these are such formidable weapons that a single blow has been known to drive a dog howling away. But it does not appear that the spurs in this case, or in that of some of the spur-winged rails, are larger in the male than in the female.* In certain plovers, however, the wing-spurs must be considered as a sexual character. Thus in the male of our common peewit (*Vanellus cristatus*) the tubercle on the shoulder of the wing becomes more prominent during the breeding-season, and the males fight together. In some species of *Lobivanellus* a similar tubercle becomes developed during the breeding-season "into a short horny spur." In the Australian *L. lobatus* both sexes have spurs, but these are much larger in the males than in the females. In an allied bird, the *Hoplopterus armatus*, the spurs do not increase in size during the breeding-season; but these birds have been seen in Egypt to fight together, in the same manner as our peewits, by turning suddenly in the air and striking sideways at each other, sometimes with fatal results. Thus also they drive away other enemies.*(2)

* For the Egyptian goose, see Macgillivray, *British Birds*, vol. iv., p. 639. For *Plectropterus*, Livingstone's *Travels*, p. 254. For *Palamedea*, Brehm's *Illustriertes Thierleben*, B. iv., s. 740. See also on this bird Azara, *Voyages dans l'Amerique merid.*, tom. iv., 1809, pp. 179, 253.

*(2) See, on our peewit, Mr. R. Carr in *Land and Water*, Aug. 8, 1868, p. 46. In regard to *Lobivanellus*, see Jerdon's *Birds of India*, vol. iii., p. 647, and Gould's *Handbook of Birds of Australia*, vol. ii., p. 220. For the *Hoplopterus*, see Mr. Allen in the *Ibis*, vol. v., 1863, p. 156.

The season of love is that of battle; but the males of some birds, as of the game-fowl and ruff, and even the young males of the wild turkey and grouse,* are ready to fight whenever they meet. The presence of the female is the teterrima belli causa. The Bengali baboos make the pretty little males of the amadavat (*Estrelida amandava*) fight together by placing three small cages in a row, with a female in the middle; after a little time the two males are turned loose, and immediately a desperate battle ensues.*(2) When many males congregate at the same appointed spot and fight together, as in the case of grouse and various other birds, they are generally attended by the females,*(3) which afterwards pair with the victorious combatants. But in some cases the pairing precedes instead of succeeding the combat: thus according to Audubon,*(4) several males of the Virginian goat-sucker (*Caprimulgus virgianus*) "court, in a highly entertaining manner the female, and no sooner has she made her choice, than her approved gives chase to all intruders and drives them beyond his dominions." Generally the males try to drive away or kill their rivals before they pair. It does not, however, appear that the females invariably prefer the victorious males. I have indeed been assured by Dr. W. Kovalevsky that the female capercaillie sometimes steals away with a young male who has not dared to enter the arena with the older cocks, in the same manner as occasionally happens with the does of the red-deer in Scotland. When two males contend in presence of a single female, the victor, no doubt, commonly gains his desire; but some of these battles are caused by wandering males trying to distract the peace of an already mated pair.*(5)

* Audubon, *Ornithological Biography*, vol. ii., p. 492; vol. i., pp. 4-13.

*(2) Mr. Blyth, *Land and Water*, 1867, p. 212.

*(3) Richardson on *Tetrao umbellus*, *Fauna Bor. Amer.: Birds*, 1831, p. 343. L. Lloyd, *Game Birds of Sweden*, 1867, pp. 22, 79, on the capercaillie and black-cock. Brehm, however, asserts (*Thierleben*, B. iv., s. 352) that in Germany the grey-hens do not generally attend the Balzen of the black-cocks, but this is an exception to the common rule; possibly the hens may lie hidden in the surrounding bushes, as is known to be the case with the grey-hens in Scandinavia, and with other species in N. America.

*(4) *Ornithological Biography*, vol. ii., p. 275.

*(5) Brehm, *Thierleben*, &c., B. iv., 1867, p. 990. Audubon, *Ornithological Biography*, vol. ii., p. 492.

Even with the most pugnacious species it is probable that the pairing does not depend exclusively on the mere strength and courage of the male; for such males are generally decorated with various ornaments, which often become more brilliant during the breeding-season, and which are sedulously displayed before the females. The males also endeavour to charm or excite their mates by love-notes, songs, and antics; and the courtship is, in many instances, a prolonged affair. Hence it is not probable that the females are indifferent to the charms of the opposite sex, or that they are invariably compelled to yield to the victorious males. It is more probable that the females are excited, either before or

after the conflict, by certain males, and thus unconsciously prefer them. In the case of *Tetrao umbellus*, a good observer* goes so far as to believe that the battles of the male "are all a sham, performed to show themselves to the greatest advantage before the admiring females who assemble around; for I have never been able to find a maimed hero, and seldom more than a broken feather." I shall have to recur to this subject, but I may here add that with the *Tetrao cupido* of the United States, about a score of males assemble at a particular spot, and, strutting about, make the whole air resound with their extraordinary noises. At the first answer from a female the males begin to fight furiously, and the weaker give way; but then, according to Audubon, both the victors and vanquished search for the female, so that the females must either then exert a choice, or the battle must be renewed. So, again, with one of the field-starlings of the United States (*Sturnella ludoviciana*) the males engage in fierce conflicts, "but at the sight of a female they all fly after her as if mad."*(2)

* Land and Water, July 25, 1868, p. 14.

*(2) Audubon's Ornithological Biography; on *Tetrao cupido*, vol. ii., p. 492; on the *Sturnus*, vol. ii., p. 219.

Vocal and instrumental music.- With birds the voice serves to express various emotions, such as distress, fear, anger, triumph, or mere happiness. It is apparently sometimes used to excite terror, as in the case of the hissing noise made by some nestling-birds. Audubon*, relates that a night-heron (*Ardea nycticorax*, Linn.), which he kept tame, used to hide itself when a cat approached, and then "suddenly start up uttering one of the most frightful cries, apparently enjoying the cat's alarm and flight." The common domestic cock clucks to the hen, and the hen to her chickens, when a dainty morsel is found. The hen, when she has laid an egg, "repeats the same note very often, and concludes with the sixth above, which she holds for a longer time";*(2) and thus she expresses her joy. Some social birds apparently call to each other for aid; and as they flit from tree to tree, the flock is kept together by chirp answering chirp. During the nocturnal migrations of geese and other water-fowl, sonorous clangs from the van may be heard in the darkness overhead, answered by clangs in the rear. Certain cries serve as danger signals, which, as the sportsman knows to his cost, are understood by the same species and by others. The domestic cock crows, and the humming-bird chirps, in triumph over a defeated rival. The true song, however, of most birds and various strange cries are chiefly uttered during the breeding-season, and serve as a charm, or merely as a call-note, to the other sex.

* Ornithological Biography, vol. v., p. 601.

*(2) The Hon. Daines Barrington, Philosophical Transactions, 1773, p. 252.

Naturalists are much divided with respect to the object of the singing of birds. Few more careful observers ever lived than Montagu, and he maintained that the "males of songbirds and of many others do not in general search for the female, but, on the contrary, their business in the spring is to perch on some conspicuous spot, breathing out their full and armorous notes, which, by instinct, the female knows, and repairs to the spot to choose her mate."* Mr. Jenner Weir informs me that this is certainly the case with the nightingale. Bechstein, who kept birds during his whole life, asserts, "that the female canary always chooses the best singer, and that in a state of nature the female finch selects that male out of a hundred whose notes please her most."*(2) There can be no doubt that birds closely attend to each other's song. Mr. Weir has told me of the case of a bullfinch which had been taught to pipe a German waltz, and who was so good a performer that he cost ten guineas; when this

bird was first introduced into a room where other birds were kept and he began to sing, all the others, consisting of about twenty linnets and canaries, ranged themselves on the nearest side of their cages, and listened with the greatest interest to the new performer. Many naturalists believe that the singing of birds is almost exclusively "the effect of rivalry and emulation," and not for the sake of charming their mates. This was the opinion of Daines Barrington and White of Selborne, who both especially attended to this subject.*⁽³⁾ Barrington, however, admits that "superiority in song gives to birds an amazing ascendancy over others, as is well known to bird-catchers."

* Ornithological Dictionary, 1833, p. 475.

*⁽²⁾ Naturgeschichte der Stubenvogel, 1840, s. 4. Mr. Harrison Weir likewise writes to me; "I am informed that the best singing males generally get a mate first, when they are bred in the same room,"

*⁽³⁾ Philosophical Transactions, 1773, p. 263. White's Natural History of Selborne, 1825, vol. i., p. 246.

It is certain that there is an intense degree of rivalry between the males in their singing. Bird-fanciers match their birds to see which will sing longest; and I was told by Mr. Yarrell that a first-rate bird will sometimes sing till he drops down almost dead, or according to Bechstein,* quite dead from rupturing a vessel in the lungs. Whatever the cause may be, male birds, as I hear from Mr. Weir, often die suddenly during the season of song. That the habit of singing is sometimes quite independent of love is clear, for a sterile, hybrid canary-bird has been described*⁽²⁾ as singing whilst viewing itself in a mirror, and then dashing at its own image; it likewise attacked with fury a female canary, when put into the same cage. The jealousy excited by the act of singing is constantly taken advantage of by bird-catchers; a male in good song, is hidden and protected, whilst a stuffed bird, surrounded by limed twigs, is exposed to view. In this manner, as Mr. Weir informs me, a man has in the course of a single day caught fifty, and in one instance, seventy, male chaffinches. The power and inclination to sing differ so greatly with birds that although the price of an ordinary male chaffinch is only sixpence, Mr. Weir saw one bird for which the bird-catcher asked three pounds; the test of a really good singer being that it will continue to sing whilst the cage is swung round the owner's head.

* Naturgesch. der Stubenvogel, 1840, s. 252.

*⁽²⁾ Mr. Bold, Zoologist, 1843-44, p. 659.

That male birds should sing from emulation as well as for charming the female, is not at all incompatible; and it might have been expected that these two habits would have concurred, like those of display and pugnacity. Some authors, however, argue that the song of the male cannot serve to charm the female, because the females of some few species, such as of the canary, robin, lark, and bullfinch, especially when in a state of widowhood, as Bechstein remarks, pour forth fairly melodious strains. In some of these cases the habit of singing may be in part attributed to the females having been highly fed and confined,* for this disturbs all the functions connected with the reproduction of the species. Many instances have already been given of the partial transference of secondary masculine characters to the female, so that it is not at all surprising that the females of some species should possess the power of song. It has also been argued, that the song of the male cannot serve as a charm, because the males of certain species, for instance of the robin, sing during the autumn.*⁽²⁾ But nothing is more common than for animals to take pleasure in practising whatever instinct they follow at other times for some real good. How often do we see birds which fly easily, gliding and sailing through the air obviously for pleasure? The cat

plays with the captured mouse, and the cormorant with the captured fish. The weaver-bird (*Ploceus*), when confined in a cage, amuses itself by neatly weaving blades of grass between the wires of its cage. Birds which habitually fight during the breeding-season are generally ready to fight at all times; and the males of the capercaillie sometimes hold their Balzen or leks at the usual place of assemblage during the autumn.*⁽³⁾ Hence it is not at all surprising that male birds should continue singing for their own amusement after the season for courtship is over.

* D. Barrington, *Philosophical Transactions*, 1773, p. 262.
Bechstein, *Stubenvogel*, 1840, s. 4.

*⁽²⁾ This is likewise the case with the water-ouzel; see Mr. Hepburn in the *Zoologist*, 1845-46, p. 1068.

*⁽³⁾ L. Lloyd, *Game Birds of Sweden*, 1867, p. 25.

As shewn in a previous chapter, singing is to a certain extent an art, and is much improved by practice. Birds can be taught various tunes, and even the unmelodious sparrow has learnt to sing like a linnet. They acquire the song of their foster parents,* and sometimes that of their neighbours.*⁽²⁾ All the common songsters belong to the Order of *Insessores*, and their vocal organs are much more complex than those of most other birds; yet it is a singular fact that some of the *Insessores*, such as ravens, crows, and magpies, possess the proper apparatus,*⁽³⁾ though they never sing, and do not naturally modulate their voices to any great extent. Hunter asserts*⁽⁴⁾ that with the true songsters the muscles of the larynx are stronger in the males than in the females; but with this slight exception there is no difference in the vocal organs of the two sexes, although the males of most species sing so much better and more continuously than the females.

* Barrington, *ibid.*, p. 264, Bechstein, *ibid.*, s. 5.

*⁽²⁾ Dureau de la Malle gives a curious instance (*Annales des Sc. Nat.*, 3rd series, *Zoolog.*, tom. x., p. 118) of some wild blackbirds in his garden in Paris, which naturally learnt a republican air from a caged bird.

*⁽³⁾ Bishop, in *Todd's Cyclopaedia of Anatomy and Physiology*, vol. iv., p. 1496.

*⁽⁴⁾ As stated by Barrington in *Philosophical Transactions*, 1773, p. 262.

It is remarkable that only small birds properly sing. The Australian genus *Menura*, however, must be excepted; for the *Menura alberti*, which is about the size of a half-grown turkey, not only mocks other birds, but "its own whistle is exceedingly beautiful and varied." The males congregate and form "corroborating places," where they sing, raising and spreading their tails like peacocks, and drooping their wings.* It is also remarkable that birds which sing well are rarely decorated with brilliant colours or other ornaments. Of our British birds, excepting the bullfinch and goldfinch, the best songsters are plain-coloured. The kingfisher, bee-eater, roller, hoopoe, wood-peckers, &c., utter harsh cries; and the brilliant birds of the tropics are hardly ever songsters.*⁽²⁾ Hence bright colours and the power of song seem to replace each other. We can perceive that if the plumage did not vary in brightness, or if bright colours were dangerous to the species, other means would be employed to charm the females; and melody of voice offers one such means.

* Gould, *Handbook of the Birds of Australia*, vol. i., 1865, pp. 308-310. See also Mr. T. W. Wood in the *Student*, April, 1870, p. 125.

*⁽²⁾ See remarks to this effect in Gould's *Introduction to the Trochilidae*, 1861, p. 22.

In some birds the vocal organs differ greatly in the two sexes. In the *Tetrao cupido* (see fig. 39) the male has two bare, orange-coloured sacks, one on each side of the neck; and these are largely inflated when the male, during the breeding-season, makes his curious hollow sound, audible at a great distance. Audubon proved that the sound was intimately connected with this apparatus (which reminds us of the air-sacks on each side of the mouth of certain male frogs), for he found that the sound was much diminished when one of the sacks of a tame bird was pricked, and when both were pricked it was altogether stopped. The female has "a somewhat similar, though smaller naked space of skin on the neck; but this is not capable of inflation."* The male of another kind of grouse (*Tetrao urophasianus*), whilst courting the female, has his "bare yellow oesophagus inflated to a prodigious size, fully half as large as the body"; and he then utters various grating, deep, hollow tones. With his neck-feathers erect, his wings lowered, and buzzing on the ground, and his long pointed tail spread out like a fan, he displays a variety of grotesque attitudes. The oesophagus of the female is not in any way remarkable.*(2)

* The Sportsman and Naturalist in Canada, by Major W. Ross King, 1866, pp. 144-146. Mr. T. W. Wood gives in the Student (April, 1870, p. 116) an excellent account of the attitude and habits of this bird during its courtship. He states that the ear-tufts or neck-plumes are erected, so that they meet over the crown of the head. See his drawing, fig. 39.

*(2) Richardson, Fauna Bor. Americana: Birds, 1831, p. 359. Audubon, *ibid.*, vol. iv., p. 507.

It seems now well made out that the great throat pouch of the European male bustard (*Otis tarda*), and of at least four other species, does not, as was formerly supposed, serve to hold water, but is connected with the utterance during the breeding-season of a peculiar sound resembling "oak."* A crow-like bird inhabiting South America (see *Cephalopterus ornatus*, fig. 40) is called the umbrella-bird, from its immense top knot, formed of bare white quills surmounted by dark-blue plumes, which it can elevate into a great dome no less than five inches in diameter, covering the whole head. This bird has on its neck a long, thin, cylindrical fleshy appendage, which is thickly clothed with scale-like blue feathers. It probably serves in part as an ornament, but likewise as a resounding apparatus; for Mr. Bates found that it is connected "with an unusual development of the trachea and vocal organs." It is dilated when the bird utters its singularly deep, loud and long sustained fluty note. The head-crest and neck-appendage are rudimentary in the female.*(2)

* The following papers have been lately written on this subject: Prof. A. Newton, in the *Ibis*, 1862, p. 107; Dr. Cullen, *ibid.*, 1865, p. 145; Mr. Flower, in *Proc. Zool. Soc.*, 1865, p. 747; and Dr. Murie, in *Proc. Zool. Soc.*, 1868, p. 471. In this latter paper an excellent figure is given of the male Australian bustard in full display with the sack distended. It is a singular fact that the sack is not developed in all the males of the same species.

*(2) Bates, *The Naturalist on the Amazons*, 1863, vol. ii., p. 284; Wallace, in *Proceedings, Zoological Society*, 1850, p. 206. A new species, with a still larger neck-appendage (*C. penduliger*), has lately been discovered, see *Ibis*, vol. i., p. 457.

The vocal organs of various web-footed and wading birds are extraordinarily complex, and differ to a certain extent in the two sexes. In some cases the trachea is convoluted, like a French horn, and is deeply embedded in the sternum. In the wild swan (*Cygnus ferus*) it is more deeply embedded in the adult male than in the adult female or young male. In the male Merganser the enlarged portion of

the trachea is furnished with an additional pair of muscles.* In one of the ducks, however, namely *Anas punctata*, the bony enlargement is only a little more developed in the male than in the female.*(2) But the meaning of these differences in the trachea of the two sexes of the Anatidae is not understood; for the male is not always the more vociferous; thus with the common duck, the male hisses, whilst the female utters a loud quack.*(3) In both sexes of one of the cranes (*Grus virgo*) the trachea penetrates the sternum, but presents "certain sexual modifications." In the male of the black stork there is also a well-marked sexual difference in the length and curvature of the bronchi.*(4) Highly important structures have, therefore, in these cases been modified according to sex.

* Bishop, in Todd's Cyclopaedia of Anatomy and Physiology, vol. iv., p. 1499.

*(2) Prof. Newton, Proc. Zoolog. Soc., 1871, p. 651.

*(3) The spoonbill (*Platalea*) has its trachea convoluted into a figure of eight, and yet this bird (Jerdon, Birds of India, vol. iii., p. 763) is mute but Mr. Blyth informs me that the convolutions are not constantly present, so that perhaps they are now tending towards abortion.

*(4) Elements of Comparative Anatomy, by R. Wagner, Eng. transl., 1845, p. 111. With respect to the swan as given above, Yarrell's History of British Birds, 2nd edition, 1845, vol. iii., p. 193.

It is often difficult to conjecture whether the many strange cries and notes uttered by male birds during the breeding-season serve as a charm or merely as a call to the female. The soft cooing of the turtle-dove and of many pigeons, it may be presumed, pleases the female. When the female of the wild turkey utters her call in the morning, the male answers by a note which differs from the gobling noise made, when with erected feathers, rustling wings and distended wattles, he puffs and struts before her.* The spel of the black-cock certainly serves as a call to the female, for it has been known to bring four or five females from a distance to a male under confinement; but as the black-cock continues his spel for hours during successive days, and in the case of the capercailzie "with an agony of passion," we are led to suppose that the females which are present are thus charmed.*(2) The voice of the common rook is known to alter during the breeding-season, and is therefore in some way sexual.*(3) But what shall we say about the harsh screams of, for instance, some kinds of macaws; have these birds as bad taste for musical sounds as they apparently have for colour, judging by the inharmonious contrast of their bright yellow and blue plumage? It is indeed possible that without any advantage being thus gained, the loud voices of many male birds may be the result of the inherited effects of the continued use of their vocal organs when excited by the strong passions of love, jealousy and rage; but to this point we shall recur when we treat of quadrupeds.

* C. L. Bonaparte, quoted in the Naturalist Library: Birds, vol. xiv., p. 126.

*(2) L. Lloyd, The Game Birds of Sweden, &c., 1867, pp. 22, 81.

*(3) Jenner, Philosophical Transactions, 1824, p. 20.

We have as yet spoken only of the voice, but the males of various birds practise, during their courtship, what may be called instrumental music. Peacocks and birds of paradise rattle their quills together. Turkey-cocks scrape their wings against the ground, and some kinds of grouse thus produce a buzzing sound. Another North American grouse, the Tetrao umbellus, when with his tail erect, his ruffs displayed, "he shows off his finery to the females, who lie hid in the neighbourhood," drums by rapidly striking his wings together above his back, according to Mr. R. Haymond, and not, as Audubon thought, by

striking them against his sides. The sound thus produced is compared by some to distant thunder, and by others to the quick roll of a drum. The female never drums, "but flies directly to the place where the male is thus engaged." The male of the Kalij-pheasant, in the Himalayas, often makes a singular drumming noise with his wings, not unlike the sound produced by shaking a stiff piece of cloth." On the west coast of Africa the little black-weavers (*Ploceus?*) congregate in a small party on the bushes round a small open space, and sing and glide through the air with quivering wings, "which make a rapid whirring sound like a child's rattle." One bird after another thus performs for hours together, but only during the courting-season. At this season, and at no other time, the males of certain night-jars (*Caprimulgus*) make a strange booming noise with their wings. The various species of woodpeckers strike a sonorous branch with their beaks, with so rapid a vibratory movement that "the head appears to be in two places at once." The sound thus produced is audible at a considerable distance but cannot be described; and I feel sure that its source would never be conjectured by any one hearing it for the first time. As this jarring sound is made chiefly during the breeding-season, it has been considered as a love-song; but it is perhaps more strictly a love-call. The female, when driven from her nest, has been observed thus to call her mate, who answered in the same manner and soon appeared. Lastly, the male hoopoe (*Upupa epops*) combines vocal and instrumental music; for during the breeding-season this bird, as Mr. Swinhoe observed, first draws in air, and then taps the end of its beak perpendicularly down against a stone or the trunk of a tree, "when the breath being forced down the tubular bill produces the correct sound." If the beak is not thus struck against some object, the sound is quite different. Air is at the same time swallowed, and the oesophagus thus becomes much swollen; and this probably acts as a resonator, not only with the hoopoe, but with pigeons and other birds.*

* For the foregoing facts see, on birds of paradise, Brehm, *Thierleben*, B. iii., s. 325. On grouse, Richardson, *Fauna Bor. Americ.*: Birds, pp. 343 and 359; Major W. Ross King, *The Sportsman in Canada*, 1866, p. 156; Mr. Haymond, in Prof. Cox's *Geol. Survey of Indiana*, p. 227; Audubon, *American Ornitholog. Biograph.*, vol. i., p. 216. On the Kalij-pheasant, Jerdon, *Birds of India*, vol. iii., p. 533. On the weavers, Livingstone's *Expedition to the Zambesi*, 1865, p. 425. On woodpeckers, Macgillivray, *Hist. of British Birds*, vol. iii., 1840, pp. 84, 88, 89, and 95. On the hoopoe, Mr. Swinhoe, in *Proc. Zoolog. Soc.*, June 23, 1863 and 1871, p. 348. On the night-jar, Audubon, *ibid.*, vol. ii., p. 255, and *American Naturalist*, 1873, p. 672. The English night-jar likewise makes in the spring a curious noise during its rapid flight.

In the foregoing cases sounds are made by the aid of structures already present and otherwise necessary; but in the following cases certain feathers have been specially modified for the express purpose of producing sounds. The drumming, bleating, neighing, or thundering noise (as expressed by different observers) made by the common snipe (*Scolopax gallinago*) must have surprised every one who has ever heard it. This bird, during the pairing-season, flies to "perhaps a thousand feet in height," and after zig-zagging about for a time descends to the earth in a curved line, with outspread tail and quivering pinions, and surprising velocity. The sound is emitted only during this rapid descent. No one was able to explain the cause until M. Meves observed that on each side of the tail the outer feathers are peculiarly formed (see fig. 41), having a stiff sabre-shaped shaft with the oblique barbs of unusual length, the outer webs being strongly bound together. He found that by blowing on these feathers, or by fastening them to a long thin stick and waving them rapidly through the air, he could reproduce the drumming noise made by the living bird. Both sexes are furnished with these feathers,

but they are generally larger in the male than in the female, and emit a deeper note. In some species, as in *S. frenata* (see fig. 42), four feathers, and in *S. javensis* (see fig. 43), no less than eight on each side of the tail are greatly modified. Different tones are emitted by the feathers of the different species when waved through the air; and the *Scolopax wilsonii* of the United States makes a switching noise whilst descending rapidly to the earth.*

* See M. Meves' interesting paper in Proc. Zool. Soc., 1858, p. 199. For the habits of the snipe, Macgillivray, History of British Birds, vol. iv., p. 371. For the American snipe, Capt. Blakiston, Ibis, vol. v., 1863, p. 131.

In the male of the *Chamaepetes unicolor* (a large gallinaceous bird of America), the first primary wing-feather is arched towards the tip and is much more attenuated than in the female. In an allied bird, the *Penelope nigra*, Mr. Salvin observed a male, which, whilst it flew downwards "with outstretched wings, gave forth a kind of crashing rushing noise," like the falling of a tree.* The male alone of one of the Indian bustards (*Sypheotides auritus*) has its primary wing-feathers greatly acuminate; and the male of an allied species is known to make a humming noise whilst courting the female.*(2) In a widely different group of birds, namely humming-birds, the males alone of certain kinds have either the shafts of their primary wing-feathers broadly dilated, or the webs abruptly excised towards the extremity. The male, for instance, of *Selasphorus platycercus*, when adult, has the first primary wing-feather (see fig. 44), thus excised. Whilst flying from flower to flower he makes "a shrill, almost whistling noise";*(3) but it did not appear to Mr. Salvin that the noise was intentionally made.

* Mr. Salvin, in Proceedings, Zoological Society, 1867, p. 160. I am much indebted to this distinguished ornithologist for sketches of the feathers of the *Chamaepetes*, and for other information.

*(2) Jerdon, Birds of India, vol. iii., pp. 618, 621.

*(3) Gould, Introduction to the Trochilidae, 1861, p. 49. Salvin, Proceedings, Zoological Society, 1867, p. 160.

Lastly, in several species of a sub-genus of *Pipra* or manakin, or manakin, the males, as described by Mr. Sclater, have their secondary wing-feathers modified in a still more remarkable manner. In the brilliantly-coloured *P. deliciosa* the first three secondaries are thick-stemmed and curved towards the body; in the fourth and fifth (see fig. 45, a) the change is greater; and in the sixth and seventh (b, c) the shaft "is thickened to an extraordinary degree, forming a solid horny lump." The barbs also are greatly changed in shape, in comparison with the corresponding feathers (d, e, f) in the female. Even the bones of the wing, which support these singular feathers in the male, are said by Mr. Fraser to be much thickened. These little birds make an extraordinary noise, the first "sharp note being not unlike the crack of a whip."*

* Sclater, in Proceedings, Zoological Society, 1860, p. 90, and in Ibis, vol. iv., 1862, p. 175. Also Salvin, in Ibis, 1860, p. 37.

The diversity of the sounds, both vocal and instrumental, made by the males of many birds during the breeding-season, and the diversity of the means for producing such sounds, are highly remarkable. We thus gain a high idea of their importance for sexual purposes, and are reminded of the conclusion arrived at as to insects. It is not difficult to imagine the steps by which the notes of a bird, primarily used as a mere call or for some other purpose, might have been improved into a melodious love song. In the case of the modified feathers, by which the drumming, whistling, or roaring noises are produced, we know that some birds during their courtship

Flutter, shake, or rattle their unmodified feathers together; and if the females were led to select the best performers, the males which possessed the strongest or thickest, or most attenuated feathers, situated on any part of the body, would be the most successful; and thus by slow degrees the feathers might be modified to almost any extent. The females, of course, would not notice each slight successive alteration in shape, but only the sounds thus produced. It is a curious fact that in the same class of animals, sounds so different as the drumming of the snipe's tail, the tapping of the woodpecker's beak, the harsh trumpet-like cry of certain water-fowl, the cooing of the turtle-dove, and the song of the nightingale, should all be pleasing to the females of the several species. But we must not judge of the tastes of distinct species by a uniform standard; nor must we judge by the standard of man's taste. Even with man, we should remember what discordant noises, the beating of tom-toms and the shrill notes of reeds, please the ears of savages. Sir S. Baker remarks,* that "as the stomach of the Arab prefers the raw meat and reeking liver taken hot from the animal, so does his ear prefer his equally coarse and discordant music to all other."

* The Nile Tributaries of Abyssinia, 1867, p. 203.

Love Antics and Dances. - The curious love gestures of some birds have already been incidentally noticed; so that little need here be added. In Northern America large numbers of a grouse, the Tetrao phasianellus, meet every morning during the breeding-season on a selected level spot, and here they run round and round in a circle of about fifteen or twenty feet in diameter, so that the ground is worn quite bare, like a fairy-ring. In these partridge-dances, as they are called by the hunters, the birds assume the strangest attitudes, and run round, some to the left and some to the right. Audubon describes the males of a heron (*Ardea herodias*) as walking about on their long legs with great dignity before the females, bidding defiance to their rivals. With one of the disgusting carrion-vultures (*Cathartes jota*) the same naturalist states that "the gesticulations and parade of the males at the beginning of the love-season are extremely ludicrous." Certain birds perform their love-antics on the wing, as we have seen with the black African weaver, instead of on the ground. During the spring our little white-throat (*Sylvia cinerea*) often rises a few feet or yards in the air above some bush, and "flutters with a fitful and fantastic motion, singing all the while, and then drops to its perch." The great English bustard throws himself into indescribably odd attitudes whilst courting the female, as has been figured by Wolf. An allied Indian bustard (*Otis bengalensis*) at such times "rises perpendicularly into the air with a hurried flapping of his wings, raising his crest and puffing out the feathers of his neck and breast, and then drops to the ground"; he repeats this manoeuvre several times, at the same time humming in a peculiar tone. Such females as happen to be near "obey this saltatory summons," and when they approach he trails his wings and spreads his tail like a turkey-cock.*

* For *Tetrao phasianellus*, see Richardson, *Fauna, Bor. Americana*, p. 361, and for further particulars, Capt. Blakiston, *Ibis*, 1863, p. 125. For the *Cathartes* and *Ardea*, Audubon, *Ornithological Biography*, vol. ii., p. 51, and vol. iii., p. 89. On the white-throat, Macgillivray, *History of British Birds*, vol. ii., p. 354. On the Indian bustard, Jerdon, *Birds of India*, vol. iii., p. 618.

But the most curious case is afforded by three allied genera of Australian birds, the famous bower-birds, - no doubt the co-descendants of some ancient species which first acquired the strange instinct of constructing bowers for performing their love-antics. The bowers (see fig. 46), which, as we shall hereafter see, are decorated with feathers, shells, bones, and leaves, are built on the ground for the

sole purpose of courtship, for their nests are formed in trees. Both sexes assist in the erection of the bowers, but the male is the principal workman. So strong is this instinct that it is practised under confinement, and Mr. Strange has described* the habits of some satin bower-birds which he kept in an aviary in New South Wales. "At times the male will chase the female all over the aviary, then go to the bower, pick up a gay feather or a large leaf, utter a curious kind of note, set all his feathers erect, run round the bower and become so excited that his eyes appear ready to start from his bead; he continues opening first one wing then the other, uttering a low, whistling note, and, like the domestic cock, seems to be picking up something from the ground, until at last the female goes gently towards him." Captain Stokes has described the habits and "play-houses" of another species, the great bower-bird, which was seen "amusing itself by flying backwards and forwards, taking a shell alternately from each side, and carrying it through the archway in its mouth." These curious creations, formed solely as halls of assemblage, where both sexes amuse themselves and pay their court, must cost the birds much labor. The bower, for instance, of the fawn-breasted species, is nearly four feet in length, eighteen inches in height, and is raised on a thick platform of sticks.

* Gould, Handbook to the Birds of Australia, vol. i., pp. 444, 449, 455. The bower of the satin bower-bird may be seen in the Zoological Society's Gardens, Regent's Park.

Decoration. - I will first discuss the cases in which the males are ornamented either exclusively or in a much higher degree than the females, and in a succeeding chapter those in which both sexes are equally ornamented, and finally the rare cases in which the female is somewhat more brightly-coloured than the male. As with the artificial ornaments used by savage and civilised men, so with the natural ornaments of birds, the head is the chief seat of decoration.* The ornaments, as mentioned at the commencement of this chapter, are wonderfully diversified. The plumes on the front or back of the head consist of variously-shaped feathers, sometimes capable of erection or expansion, by which their beautiful colours are fully displayed. Elegant ear-tufts (see fig. 39, ante) are occasionally present. The head is sometimes covered with velvety down, as with the pheasant; or is naked and vividly coloured. The throat, also, is sometimes ornamented with a beard, wattles, or caruncles. Such appendages are generally brightly-coloured, and no doubt serve as ornaments, though not always ornamental in our eyes; for whilst the male is in the act of courting the female, they often swell and assume vivid tints, as in the male turkey. At such times the fleshy appendages about the head of the male tragopan pheasant (*Cerionis temminckii*) swell into a large lappet on the throat and into two horns, one on each side of the splendid topknot; and these are then coloured of the most intense blue which I have ever beheld.*(2) The African hornbill (*Bucorax abyssinicus*) inflates the scarlet bladder-like wattle on its neck, and with its wings drooping and tail expanded "makes quite a grand appearance."*(3) Even the iris of the eye is sometimes more brightly-coloured in the male than in the female; and this is frequently the case with the beak, for instance, in our common blackbird. In *Buceros corrugatus*, the whole beak and immense casque are coloured more conspicuously in the male than in the female; and "the oblique grooves upon the sides of the lower mandible are peculiar to the male sex."*(4)

* See remarks to this effect, on the "Feeling of Beauty among Animals," by Mr. J. Shaw, in the *Athenaeum*, Nov. 24, 1866, p. 681.

*(2) See Dr. Murie's account with coloured figures in *Proceedings, Zoological Society*, 1872, p. 730.

*(3) Mr. Monteiro, *Ibis*, vol. iv., 1862, p. 339.

*(4) *Land and Water*, 1868, p. 217.

The head, again, often supports fleshy appendages, filaments, and solid protuberances. These, if not common to both sexes, are always confined to the males. The solid protuberances have been described in detail by Dr. W. Marshall,* who shews that they are formed either of cancellated bone coated with skin, or of dermal and other tissues. With mammals true horns are always supported on the frontal bones, but with birds various bones have been modified for this purpose; and in species of the same group the protuberances may have cores of bone, or be quite destitute of them, with intermediate gradations connecting these two extremes. Hence, as Dr. Marshall justly remarks, variations of the most different kinds have served for the development through sexual selection of these ornamental appendages. Elongated feathers or plumes spring from almost every part of the body. The feathers on the throat and breast are sometimes developed into beautiful ruffs and collars. The tail-feathers are frequently increased in length; as we see in the tail-coverts of the peacock, and in the tail itself of the Argus pheasant. With the peacock even the bones of the tail have been modified to support the heavy tail-coverts.*(2) The body of the Argus is not larger than that of a fowl; yet the length from the end of the beak to the extremity of the tail is no less than five feet three inches,*(3) and that of the beautifully ocellated secondary wing-feathers nearly three feet. In a small African night-jar (*Cosmetornis vexillarius*) one of the primary wing-feathers, during the breeding-season, attains a length of twenty-six inches, whilst the bird itself is only ten inches in length. In another closely-allied genus of night-jars, the shafts of the elongated wing-feathers are naked, except at the extremity, where there is a disc.*(4) Again, in another genus of night-jars, the tail-feathers are even still more prodigiously developed. In general the feathers of the tail are more often elongated than those of the wings, as any great elongation of the latter impedes flight. We thus see that in closely-allied birds ornaments of the same kind have been gained by the males through the development of widely different feathers.

* "Uber die Schadel hocker," *Niederland. Archiv. fur Zoologie*, B. i., Heft 2, 1872.

*(2) Dr. W. Marshall, "Uber den Vogelschwanz," *ibid.*, B. i., Heft 2, 1872.

*(3) Jardine's *Naturalist Library: Birds*, vol. xiv., p. 166.

*(4) Sclater, in the *Ibis*, vol. vi., 1864, p. 114; Livingstone, *Expedition to the Zambesi*, 1865, p. 66.

It is a curious fact that the feathers of species belonging to very distinct groups have been modified in almost exactly the same peculiar manner. Thus the wing-feathers in one of the above-mentioned night-jars are bare along the shaft, and terminate in a disc; or are, as they are sometimes called, spoon or racket-shaped. Feathers of this kind occur in the tail of a motmot (*Eumomota superciliaris*), of a king-fisher, finch, humming-bird, parrot, several Indian drongos (*Dicrurus* and *Edolius*, in one of which the disc stands vertically), and in the tail of certain birds of paradise. In these latter birds, similar feathers, beautifully ocellated, ornament the head, as is likewise the case with some gallinaceous birds. In an Indian bustard (*Sypheotides auritus*) the feathers forming the ear-tufts, which are about four inches in length, also terminate in discs.* It is a most singular fact that the motmots, as Mr. Salvin has clearly shown,*(2) give to their tail feathers the racket-shape by biting off the barbs, and, further, that this continued mutilation has produced a certain amount of inherited effect.

* Jerdon, *Birds of India*, vol. iii., p. 620.

*(2) *Proceedings, Zoological Society*, 1873, p. 429.

Again, the barbs of the feathers in various widely-distinct birds are filamentous or plumose, as with some herons, ibises, birds of paradise, and Gallinaceae. In other cases the barbs disappear, leaving the shafts bare from end to end; and these in the tail of the *Paradisea apoda* attain a length of thirty-four inches: * in *P. Papuana* (see fig. 47) they are much shorter and thin. Smaller feathers when thus denuded appear like bristles, as on the breast of the turkey-cock. As any fleeting fashion in dress comes to be admired by man, so with birds a change of almost any kind in the structure or colouring of the feathers in the male appears to have been admired by the female. The fact of the feathers in widely distinct groups having been modified in an analogous manner no doubt depends primarily on all the feathers having nearly the same structure and manner of development, and consequently tending to vary in the same manner. We often see a tendency to analogous variability in the plumage of our domestic breeds belonging to distinct species. Thus top-knots have appeared in several species. In an extinct variety of the turkey, the top-knot consisted of bare quills surmounted with plumes of down, so that they somewhat resembled the racket-shaped feathers above described. In certain breeds of the pigeon and fowl the feathers are plumose, with some tendency in the shafts to be naked. In the Sebastopol goose the scapular feathers are greatly elongated, curled, or even spirally twisted, with the margins plumose.* (2)

* Wallace, in *Annals and Magazine of Natural History*, vol. xx., 1857, p. 416, and in his *Malay Archipelago*, vol. ii., 1869, p. 390.

* (2) See my work on *The Variation of Animals and Plants under Domestication*, vol. i., pp. 289, 293.

In regard to colour, hardly anything need here be said, for every one knows how splendid are the tints of many birds, and how harmoniously they are combined. The colours are often metallic and iridescent. Circular spots are sometimes surrounded by one or more differently shaded zones, and are thus converted into ocelli. Nor need much be said on the wonderful difference between the sexes of many birds. The common peacock offers a striking instance. Female birds of paradise are obscurely coloured and destitute of all ornaments, whilst the males are probably the most highly decorated of all birds, and in so many different ways that they must be seen to be appreciated. The elongated and golden-orange plumes which spring from beneath the wings of the *Paradisea apoda*, when vertically erected and made to vibrate, are described as forming a sort of halo, in the centre of which the head "looks like a little emerald sun with its rays formed by the two plumes."* In another most beautiful species the head is bald, "and of a rich cobalt blue, crossed by several lines of black velvety feathers."* (2)

* Quoted from M. de Lafresnaye in *Annals and Mag. of Natural History*, vol. xiii., 1854, p. 157: see also Mr. Wallace's much fuller account in vol. xx., 1857, p. 412, and in his *The Malay Archipelago*.

* (2) Wallace, *The Malay Archipelago*, vol. ii., 1869, p. 405.

Male humming-birds (see figs. 48 and 49) almost vie with birds of paradise in their beauty, as every one will admit who has seen Mr. Gould's splendid volumes, or his rich collection. It is very remarkable in how many different ways these birds are ornamented. Almost every part of their plumage has been taken advantage of, and modified; and the modifications have been carried, as Mr. Gould shewed me, to a wonderful extreme in some species belonging to nearly every sub-group. Such cases are curiously like those which we see in our fancy breeds, reared by man for the sake of ornament; certain individuals originally varied in one character, and other individuals of the same species in other characters; and these have been seized on by man and much augmented- as shewn by the tail of

the fantail-pigeon, the hood of the jacobin, the beak and wattle of the carrier, and so forth. The sole difference between these cases is that in the one, the result is due to man's selection, whilst in the other, as with humming-birds, birds of paradise, &c., it is due to the selection by the females of the more beautiful males.

I will mention only one other bird, remarkable from the extreme contrast in colour between the sexes, namely the famous bell-bird (*Chasmorhynchus niveus*) of S. America, the note of which can be distinguished at the distance of nearly three miles, and astonishes every one when first hearing it. The male is pure white, whilst the female is dusky-green; and white is a very rare colour in terrestrial species of moderate size and inoffensive habits. The male, also, as described by Waterton, has a spiral tube, nearly three inches in length, which rises from the base of the beak. It is jet-black, dotted over with minute downy feathers. This tube can be inflated with air, through a communication with the palate; and when not inflated hangs down on one side. The genus consists of four species, the males of which are very distinct, whilst the females, as described by Mr. Sclater in a very interesting paper, closely resemble each other, thus offering an excellent instance of the common rule that within the same group the males differ much more from each other than do the females. In a second species (*C. nudicollis*) the male is likewise snow-white, with the exception of a large space of naked skin on the throat and round the eyes, which during the breeding-season is of a fine green colour. In a third species (*C. tricarunculatus*) the head and neck alone of the male are white, the rest of the body being chestnut-brown, and the male of this species is provided with three filamentous projections half as long as the body- one rising from the base of the beak, and the two others from the corners of the mouth.*

* Mr. Sclater, *Intellectual Observer*, Jan., 1867. Waterton's *Wanderings*, p. 118. See also Mr. Salvin's interesting paper, with a plate, in the *Ibis*, 1865, p. 90.

The coloured plumage and certain other ornaments of the adult males are either retained for life, or are periodically renewed during the summer and breeding-season. At this same season the beak and naked skin about the head frequently change colour, as with some herons, ibises, gulls, one of the bell-birds just noticed, &c. In the white ibis, the cheeks, the inflatable skin of the throat, and the basal portion of the beak then become crimson.* In one of the rails, *Gallicrex cristatus*, a large red caruncle is developed during this period on the head of the male. So it is with a thin horny crest on the beak of one of the pelicans, *P. erythrorhynchus*; for, after the breeding-season, these horny crests are shed, like horns from the heads of stags, and the shore of an island in a lake in Nevada was found covered with these curious exuviae.*(2)

* *Land and Water*, 1867, p. 394.

*(2) Mr. D. G. Elliot, in *Proc. Zool. Soc.*, 1869, p. 589.

Changes of colour in the plumage according to the season depend, firstly on a double annual moult, secondly on an actual change of colour in the feathers themselves, and thirdly on their dull-coloured margins being periodically shed, or on these three processes more or less combined. The shedding of the deciduary margins may be compared with the shedding of their down by very young birds; for the down in most cases arises from the summits of the first true feathers.*

* Nitzsch's "Pterylography," edited by P. L. Sclater, Ray Society, 1867, p. 14.

With respect to the birds which annually undergo a double moult,

there are, firstly, some kinds, for instance snipes, swallow-plovers (Glareolae), and curlews, in which the two sexes resemble each other, and do not change colour at any season. I do not know whether the winter plumage is thicker and warmer than the summer plumage, but warmth seems the most probable end attained of a double moult, where there is no change of colour. Secondly, there are birds, for instance, certain species of Totanus and other Gallatores, the sexes of which resemble each other, but in which the summer and winter plumage differ slightly in colour. The difference, however, in these cases is so small that it can hardly be an advantage to them; and it may, perhaps, be attributed to the direct action of the different conditions to which the birds are exposed during the two seasons. Thirdly, there are many other birds the sexes of which are alike, but which are widely different in their summer and winter plumage. Fourthly, there are birds the sexes of which differ from each other in colour; but the females, though moulting twice, retain the same colours throughout the year, whilst the males undergo a change of colour, sometimes a great one, as with certain bustards. Fifthly and lastly, there are birds the sexes of which differ from each other each other in both their summer and winter plumage; but the male undergoes a greater amount of change at each recurrent season than the female of which the ruff (*Machetes pugnax*) offers a good instance.

With respect to the cause or purpose of the differences in colour between the summer and winter plumage, this may in some instances, as with the ptarmigan,* serve during both seasons as a protection. When the difference between the two plumages is slight it may perhaps be attributed, as already remarked, to the direct action of the conditions of life. But with many birds there can hardly be a doubt that the summer plumage is ornamental, even when both sexes are alike. We may conclude that this is the case with many herons, egrets, &c., for they acquire their beautiful plumes only during the breeding-season. Moreover, such plumes, top-knots, &c., though possessed by both sexes, are occasionally a little more developed in the male than in the female; and they resemble the plumes and ornaments possessed by the males alone of other birds. It is also known that confinement, by affecting the reproductive system of male birds, frequently checks the development of their secondary sexual characters, but has no immediate influence on any other characters; and I am informed by Mr. Bartlett that eight or nine specimens of the knot (*Tringa canutus*) retained their unadorned winter plumage in the Zoological Gardens throughout the year, from which fact we may infer that the summer plumage, though common to both sexes, partakes of the nature of the exclusively masculine plumage of many other birds.*(2)

* The brown mottled summer plumage of the ptarmigan is of as much importance to it, as a protection, as the white winter plumage; for in Scandinavia during the spring, when the snow has disappeared, this bird is known to suffer greatly from birds of prey, before it has acquired its summer dress: see Wilhelm von Wright, in Lloyd, Game Birds of Sweden, 1867, p. 125.

*(2) In regard to the previous statements on moulting, see, on snipes, &c., Macgillivray, Hist. Brit. Birds, vol. iv., p. 371; on Glareolae, curlews, and bustards, Jerdon, Birds of India, vol. iii., pp. 615, 630, 683; on Totanus, *ibid.*, p. 700; on the plumes of herons, *ibid.*, p. 738, and Macgillivray, vol. iv., pp. 435 and 444, and Mr. Stafford Allen, in the Ibis, vol. v., 1863, p. 33.

From the foregoing facts, more especially from neither sex of certain birds changing colour during either annual moult, or changing so slightly that the change can hardly be of any service to them, and from the females of other species moulting twice yet retaining the same colours throughout the year, we may conclude that the habit of annually moulting twice has not been acquired in order that the male should assume an ornamental character during the

breeding-season; but that the double moult, having been originally acquired for some distinct purpose, has subsequently been taken advantage of in certain cases for gaining a nuptial plumage.

It appears at first sight a surprising circumstance that some closely-allied species should regularly undergo a double annual moult, and others only a single one. The ptarmigan, for instance, moults twice or even thrice in the year, and the blackcock only once: some of the splendidly coloured honey-suckers (*Nectariniæ*) of India and some sub-genera of obscurely coloured pipits (*Anthus*) have a double, whilst others have only a single annual moult.* But the gradations in the manner of moulting, which are known to occur with various birds, shew us how species, or whole groups, might have originally acquired their double annual moult, or having once gained the habit, have again lost it. With certain bustards and plovers the vernal moult is far from complete, some feathers being renewed, and some changed in colour. There is also reason to believe that with certain bustards and rail-like birds, which properly undergo a double moult, some of the older males retain their nuptial plumage throughout the year. A few highly modified feathers may merely be added during the spring to the plumage, as occurs with the disc-formed tail-feathers of certain drongos (*Bhringa*) in India, and with the elongated feathers on the back, neck, and crest of certain herons. By such steps as these, the vernal moult might be rendered more and more complete, until a perfect double moult was acquired. Some of the birds of paradise retain their nuptial feathers throughout the year, and thus have only a single moult; others cast them directly after the breeding-season, and thus have a double moult; and others again cast them at this season during the first year, but not afterwards; so that these latter species are intermediate in their manner of moulting. There is also a great difference with many birds in the length of time during which the two annual plumages are retained; so that the one might come to be retained for the whole year, and the other completely lost. Thus in the spring *Machetes pugnax* retains his ruff for barely two months. In Natal the male widow-bird (*Chera progne*) acquires his fine plumage and long tail-feathers in December or January, and loses them in March; so that they are retained only for about three months. Most species, which undergo a double moult, keep their ornamental feathers for about six months. The male, however, of the wild *Gallus bankiva* retains his neck-hackles for nine or ten months; and when these are cast off, the underlying black feathers on the neck are fully exposed to view. But with the domesticated descendant of this species, the neck-hackles of the male are immediately replaced by new ones; so that we here see, as to part of the plumage, a double moult changed under domestication into a single moult.*(2)

* On the moulting of the ptarmigan, see Gould's *Birds of Great Britain*. On the honey-suckers, Jerdon, *Birds of India*, vol. i., pp. 359, 365, 369. On the moulting of *Anthus*, see Blyth, in *Ibis*, 1867, p. 32.

*(2) For the foregoing statements in regard to partial moults, and on old males retaining their nuptial plumage, see Jerdon, on bustards and plovers, in *Birds of India*, vol. iii., pp. 617, 637, 709, 711. Also Blyth in *Land and Water*, 1867, p. 84. On the moulting of Paradisea, see an interesting article by Dr. W. Marshall, *Archives Neerlandaises*, tom. vi., 1871. On the *Vidua*, *Ibis*, vol. iii., 1861, p. 133. On the *Drongoshrikes*, Jerdon, *ibid.*, vol. i., p. 435. On the vernal moult of the *Herodias bubulcus*, Mr. S. S. Allen, in *Ibis*, 1863, p. 33. On *Gallus bankiva*, Blyth, in *Annals and Mag. of Natural History*, vol. i., 1848, p. 455; see, also, on this subject, my *Variation of Animals under Domestication*, vol. i., p. 236.

The common drake (*Anas boschas*), after the breeding-season, is well known to lose his male plumage for a period of three months, during which time he assumes that of the female. The male pin-tail duck (*Anas acuta*) loses his plumage for the shorter period of six

weeks or two months; and Montagu remarks that "this double moult within so short a time is a most extraordinary circumstance, that seems to bid defiance to all human reasoning." But the believer in the gradual modification of species will be far from feeling surprise at finding gradations of all kinds. If the male pin-tail were to acquire his new plumage within a still shorter period, the new male feathers would almost necessarily be mingled with the old, and both with some proper to the female; and this apparently is the case with the male of a not distantly-allied bird, namely the Merganser serrator, for the males are said to "undergo a change of plumage, which assimilates them in some measure to the female." By a little further acceleration in the process, the double moult would be completely lost.*

* See Macgillivray, Hist. British Birds (vol. v., pp. 34, 70, and 223), on the moulting of the Anatidae, with quotations from Waterton and Montagu. Also Yarrell, History of British Birds, vol. iii., p. 243.

Some male birds, as before stated, become more brightly coloured in the spring, not by a vernal moult, but either by an actual change of colour in the feathers, or by their obscurely-coloured deciduary margins being shed. Changes of colour thus caused may last for a longer or shorter time. In the *Pelecanus onocrotalus* a beautiful rosy tint, with lemon-coloured marks on the breast, overspreads the whole plumage in the spring; but these tints, as Mr. Sclater states, "do not last long, disappearing generally in about six weeks or two months after they have been attained." Certain finches shed the margins of their feathers in the spring, and then become brighter coloured, while other finches undergo no such change. Thus the *Fringilla tristis* of the United States (as well as many other American species) exhibits its bright colours only when the winter is past, whilst our goldfinch, which exactly represents this bird in habits, and our siskin, which represents it still more closely in structure, undergo no such annual change. But a difference of this kind in the plumage of allied species is not surprising, for with the common linnet, which belongs to the same family, the crimson forehead and breast are displayed only during the summer in England, whilst in Madeira these colours are retained throughout the year.*

* On the pelican, see Sclater, in Proc. Zool. Soc., 1868, p. 265. On the American finches, see Audubon, Ornithological Biography, vol. i., pp. 174, 221, and Jerdon, Birds of India, vol. ii., p. 383. On the *Fringilla cannabina* of Madeira, Mr. E. Vernon Harcourt, Ibis, vol. v., 1863, p. 230.

Display by Male Birds of their Plumage. - Ornaments of all kinds, whether permanently or temporarily gained, are sedulously displayed by the males, and apparently serve to excite, attract, or fascinate the females. But the males will sometimes display their ornaments, when not in the presence of the females, as occasionally occurs with grouse at their balz-places, and as may be noticed with the peacock; this latter bird, however, evidently wishes for a spectator of some kind, and, as I have often seen, will show off his finery before poultry, or even pigs.* All naturalists who have closely attended to the habits of birds, whether in a state of nature or under confinement, are unanimously of opinion that the males take delight in displaying their beauty. Audubon frequently speaks of the male as endeavouring in various ways to charm the female. Mr. Gould, after describing some peculiarities in a male humming-bird, says he has no doubt that it has the power of displaying them to the greatest advantage before the female. Dr. Jerdon*(2) insists that the beautiful plumage of the male serves "to fascinate and attract the female." Mr. Bartlett, at the Zoological Gardens, expressed himself to me in the strongest terms to the same effect.

* See also Ornamental Poultry, by Rev. E. S. Dixon, 1848, p. 8.

*(2) Birds of India, introduct., vol. i., p. xxiv.; on the peacock, vol. iii., p. 507. See Gould's Introduction to Trochilidae, 1861, pp. 15 and 111.

It must be a grand sight in the forests of India "to come suddenly on twenty or thirty pea-fowl, the males displaying their gorgeous trains, and strutting about in all the pomp of pride before the gratified females." The wild turkey-cock erects his glittering plumage, expands his finely-zoned tail and barred wing-feather, and altogether, with his crimson and blue wattles, makes a superb, though, to our eye, grotesque appearance. Similar facts have already been given with respect to grouse of various kinds. Turning to another Order: The male *Rupicola crocea* (see fig. 50) is one of the most beautiful birds in the world, being of a splendid orange, with some of the feathers curiously truncated and plumose. The female is brownish-green, shaded with red, and has a much smaller crest. Sir R. Schomburgk has described their courtship; he found one of their meeting-places where ten males and two females were present. The space was from four to five feet in diameter, and appeared to have been cleared of every blade of grass and smoothed as if by human hands. A male "was capering, to the apparent delight of several others. Now spreading its wings, throwing up its head, or opening its tail like a fan; now strutting about with a hopping gait until tired, when it gabbled some kind of note, and was relieved by another. Thus three of them successively took the field, and then, with self-approbation, withdrew to rest." The Indians, in order to obtain their skins, wait at one of the meeting-places till the birds are eagerly engaged in dancing, and then are able to kill with their poisoned arrows four or five males, one after the other.* With birds of paradise a dozen or more full-plumaged males congregate in a tree to hold a dancing-party, as it is called by the natives: and here they fly about, raise their wings, elevate their exquisite plumes, and make them vibrate, and the whole tree seems, as Mr. Wallace remarks, to be filled with waving plumes. When thus engaged, they become so absorbed that a skilful archer may shoot nearly the whole party. These birds, when kept in confinement in the Malay Archipelago, are said to take much care in keeping their feathers clean; often spreading them out, examining them, and removing every speck of dirt. One observer, who kept several pairs alive, did not doubt that the display of the male was intended to please the female.*(2)

* Journal of R. Geograph. Soc., vol. x., 1840, p. 236.

*(2) Annals and Mag. of Nat. Hist., vol. xiii., 1854, p. 157; also Wallace, *ibid.*, vol. xx., 1857, p. 412, and *The Malay Archipelago*, vol. ii., 1869, p. 252. Also Dr. Bennett, as quoted by Brehm, *Illustriertes Thierleben*, B. iii., s. 326.

The gold and Amherst pheasants during their courtship not only expand and raise their splendid frills, but twist them, as I have myself seen, obliquely towards the female on whichever side she may be standing, obviously in order that a large surface may be displayed before her.* They likewise turn their beautiful tails and tail-coverts a little towards the same side. Mr. Bartlett has observed a male *Polyplectron* (see fig. 51) in the act of courtship, and has shown me a specimen stuffed in the attitude then assumed. The tail and wing-feathers of this bird are ornamented with beautiful ocelli, like those on the peacock's train. Now when the peacock displays himself, he expands and erects his tail transversely to his body, for he stands in front of the female, and has to shew off, at the same time, his rich blue throat and breast. But the breast of the *Polyplectron* is obscurely coloured, and the ocelli are not confined to the tail-feathers. Consequently the *Polyplectron* does not stand in front of the female; but he erects and expands his tail-feathers a little obliquely, lowering the expanded wing on the same side, and

raising that on the opposite side. In this attitude the ocelli over the whole body are exposed at the same time before the eyes of the admiring female in one grand bespangled expanse. To whichever side she may turn, the expanded wings and the obliquely-held tail are turned towards her. The male tragopan pheasant acts in nearly the same manner, for he raises the feathers of the body, though not the wing itself, on the side which is opposite to the female, and which would otherwise be concealed, so that nearly all the beautifully spotted feathers are exhibited at the same time.

* Mr. T. W. Wood has given (*The Student*, April, 1870, p. 115) a full account of this manner of display, by the gold pheasant and by the Japanese pheasant, *Ph. versicolor*; and he calls it the lateral or one-sided display.

The Argus pheasant affords a much more remarkable case. The immensely developed secondary wing-feathers are confined to the male; and each is ornamented with a row of from twenty to twenty-three ocelli, above an inch in diameter. These feathers are also elegantly marked with oblique stripes and rows of spots of a dark colour, like those on the skin of a tiger and leopard combined. These beautiful ornaments are hidden until the male shows himself off before the female. He then erects his tail, and expands his wing-feathers into a great, almost upright, circular fan or shield, which is carried in front of the body. The neck and head are held on one side, so that they are concealed by the fan; but the bird in order to see the female, before whom he is displaying himself, sometimes pushes his head between two of the long wing-feathers (as Mr. Bartlett has seen), and then presents a grotesque appearance. This must be a frequent habit with the bird in a state of nature, for Mr. Bartlett and his son on examining some perfect skins sent from the East, found a place between two of the feathers which was much frayed, as if the head had here frequently been pushed through. Mr. Wood thinks that the male can also peep at the female on one side, beyond the margin of the fan.

The ocelli on the wing-feathers are wonderful objects; for they are so shaded that, as the Duke of Argyll remarks,* they stand out like balls lying loosely within sockets. When I looked at the specimen in the British Museum, which is mounted with the wings expanded and trailing downwards, I was however greatly disappointed, for the ocelli appeared flat, or even concave. But Mr. Gould soon made the case clear to me, for he held the feathers erect. in the position in which they would naturally be displayed, and now from the light shining on them from above each ocellus at once resembled the ornament called a ball and socket. These feathers have been shewn to several artists, and all have expressed their admiration at the perfect shading. It may well be asked, could such artistically shaded ornaments have been formed by means of sexual selection? But it will be convenient to defer giving an answer to this question until we treat in the next chapter of the principle of gradation.

* *The Reign of Law*, 1867, p. 203.

The foregoing remarks relate to the secondary wing-feathers, but the primary wing-feathers, which in most gallinaceous birds are uniformly coloured, are in the Argus pheasant equally wonderful. They are of a soft brown tint with numerous dark spots, each of which consists of two or three black dots with a surrounding dark zone. But the chief ornament is a space parallel to the dark-blue shaft, which in outline forms a perfect second feather lying within the true feather. This inner part is coloured of a lighter chestnut, and is thickly dotted with minute white points. I have shewn this feather to several persons, and many have admired it even more than the ball and socket feathers, and have declared that it was more like a work of art than of nature. Now these feathers are quite hidden on all ordinary occasions, but are fully displayed, together with

the long secondary feathers, when they are all expanded together so as to form the great fan or shield.

The case of the male Argus pheasant is eminently interesting, because it affords good evidence that the most refined beauty may serve as a sexual charm, and for no other purpose. We must conclude that this is the case, as the secondary and primary wing-feathers are not at all displayed, and the ball and socket ornaments are not exhibited in full perfection until the male assumes the attitude of courtship. The Argus pheasant does not possess brilliant colours, so that his success in love appears to depend on the great size of his plumes, and on the elaboration of the most elegant patterns. Many will declare that it is utterly incredible that a female bird should be able to appreciate fine shading and exquisite patterns, It is undoubtedly a marvellous fact that she should possess this almost human degree of taste. He who thinks that he can safely gauge the discrimination and taste of the lower animals may deny that the female Argus pheasant can appreciate such refined beauty; but he will then be compelled to admit that the extraordinary attitudes assumed by the male during the act of courtship, by which the wonderful beauty of his plumage is fully displayed, are purposeless; and this is a conclusion which I for one will never admit.

Although so many pheasants and allied gallinaceous birds carefully display their plumage before the females, it is remarkable, as Mr. Bartlett informs me, that this is not the case with the dull-coloured Eared and Cheer pheasants (*Crossoptilon auritum* and *Phasianus wallichii*); so that these birds seem conscious that they have little beauty to display. Mr. Bartlett has never seen the males of either of these species fighting together, though he has not had such good opportunities for observing the Cheer or the Eared pheasant. Mr. Jenner Weir, also, finds that all male birds with rich or strongly-characterised plumage are more quarrelsome than the dull-coloured species belonging to the same groups. The goldfinch, for instance, is far more pugnacious than the linnet, and the blackbird than the thrush. Those birds which undergo a seasonal change of plumage likewise become much more pugnacious at the period when they are most gaily ornamented. No doubt the males of some obscurely-coloured birds fight desperately together, but it appears that when sexual selection has been highly influential, and has given bright colours to the males of any species, it has also very often given a strong tendency to pugnacity. We shall meet with nearly analogous cases when we treat of mammals. On the other hand, with birds the power of song and brilliant colours have rarely been both acquired by the males of the same species; but in this case the advantage gained would have been the same, namely, success in charming the female. Nevertheless it must be owned that the males of several brilliantly coloured birds have had their feathers specially modified for the sake of producing instrumental music, though the beauty of this cannot be compared, at least according to our taste, with that of the vocal music of many songsters.

We will now turn to male birds which are not ornamented in any high degree, but which nevertheless display during their courtship whatever attractions they may possess. These cases are in some respects more curious than the foregoing, and have been but little noticed. I owe the following facts to Mr. Weir, who has long kept confined birds of many kinds, including all the British Fringillidae and Emberizidae. The facts have been selected from a large body of valuable notes kindly sent me by him. The bullfinch makes his advances in front of the female, and then puffs out his breast, so that many more of the crimson feathers are seen at once than otherwise would be the case. At the same time he twists and bows his black tail from side to side in a ludicrous manner. The male chaffinch also stands in front of the female, thus showing his red breast and "blue bell," as the fanciers call his head; the wings at the same time being slightly expanded, with the pure white bands on the shoulders thus rendered conspicuous. The common linnet distends his rosy breast,

slightly expands his brown wings and tail, so as to make the best of them by exhibiting their white edgings. We must, however, be cautious in concluding that the wings are spread out solely for display, as some birds do so whose wings are not beautiful. This is the case with the domestic cock, but it is always the wing on the side opposite to the female which is expanded, and at the same time scraped on the ground. The male gold-finch behaves differently from all other finches: his wings are beautiful, the shoulders being black, with the dark-tipped wing-feathers spotted with white and edged with golden yellow. When he courts the female, he sways his body from side to side, and quickly turns his slightly expanded wings first to one side, then to the other, with a golden flashing effect. Mr. Weir informs me that no other British finch turns thus from side to side during his courtship, not even the closely-allied male siskin, for he would not thus add to his beauty.

Most of the British buntings are plain coloured birds; but in the spring the feathers on the head of the male reed-bunting (*Emberiza schaeeniculus*) acquire a fine black colour by the abrasion of the dusky tips; and these are erected during the act of courtship. Mr. Weir has kept two species of *Amadina* from Australia: the *A. castanotis* is a very small and chastely coloured finch, with a dark tail, white rump, and jet-black upper tail-coverts, each of the latter being marked with three large conspicuous oval spots of white.* This species, when courting the female, slightly spreads out and vibrates these parti-coloured tail-coverts in a very peculiar manner. The male *Amadina lathami* behaves very differently, exhibiting before the female his brilliantly spotted breast, scarlet rump, and scarlet upper tail-coverts. I may here add from Dr. Jerdon that the Indian bulbul (*Pycnonotus hoemorrhous*) has its under tail-coverts of a crimson colour, and these, it might be thought could never be well exhibited; but the bird "when excited often spreads them out laterally so that they can be seen even from above."*(2) The crimson under tail-coverts of some other birds as with one of the woodpeckers, *Picus major*, can be seen without any such display. The common pigeon has iridescent feathers on the breast, and every one must have seen how the male inflates his breast whilst courting the female, thus shewing them off to the best advantage. One of the beautiful bronze-winged pigeons of Australia (*Ocyphaps lophotes*) behaves, as described to me by Mr. Weir, very differently: the male, whilst standing before the female, lowers his head almost to the ground, spreads out and raises his tail, and half expands his wings. He then alternately and slowly raises and depresses his body, so that the iridescent metallic feathers are all seen at once, and glitter in the sun.

* For the description of these birds, see Gould's Handbook of the Birds of Australia, vol. i., 1865, p. 417.

*(2) Birds of India, vol. ii., p. 96.

Sufficient facts have now been given to shew with what care male birds display their various charms, and this they do with the utmost skill. Whilst preening their feathers, they have frequent opportunities for admiring themselves, and of studying how best to exhibit their beauty. But as all the males of the same species display themselves in exactly the same manner, it appears that actions, at first perhaps intentional, have become instinctive. If so, we ought not to accuse birds of conscious vanity; yet when we see a peacock strutting about, with expanded and quivering tail-feathers, he seems the very emblem of pride and vanity.

The various ornaments possessed by the males are certainly of the highest importance to them, for in some cases they have been acquired at the expense of greatly impeded powers of flight or of running. The African night-jar (*Cosmetornis*), which during the pairing-season has one of its primary wing-feathers developed into a streamer of very great length, is thereby much retarded in its flight,

although at other times remarkable for its swiftness. The "unwieldy size" of the secondary wing-feather of the male Argus pheasant is said "almost entirely to deprive the bird of flight." The fine plumes of male birds of paradise trouble them during a high wind. The extremely long tail-feathers of the male widow-birds (*Vidua*) of Southern Africa render "their flight heavy;" but as soon as these are cast off they fly as well as the females. As birds always breed when food is abundant, the males probably do not suffer much inconvenience in searching for food from their impeded powers of movement; but there can hardly be a doubt that they must be much more liable to be struck down by birds of prey. Nor can we doubt that the long train of the peacock and the long tail and wing-feathers of the Argus pheasant must render them an easier prey to any prowling tiger-cat than would otherwise be the case. Even the bright colours of many male birds cannot fail to make them conspicuous to their enemies of all kinds. Hence, as Mr. Gould has remarked, it probably is that such birds are generally of a shy disposition, as if conscious that their beauty was a source of danger, and are much more difficult to discover or approach, than the sombre coloured and comparatively tame females or than the young and as yet unadorned males.*

* On the *Cosmetornis*, see Livingstone's Expedition to the Zambesi, 1865, p. 66. On the Argus pheasant, Jardine's Nat. Hist. Lib.: Birds, vol. xiv., p. 167. On birds of paradise, Lesson, quoted by Brehm, Thierleben, B. iii., s. 325. On the widow-bird, Barrow's Travels in Africa, vol. i., p. 243, and Ibis. vol., iii., 1861 p. 133. Mr. Gould, on the shyness of male birds, Handbook to Birds of Australia, vol. i., 1865, pp. 210, 457

It is a more curious fact that the males of some birds which are provided with special weapons for battle, and which in a state of nature are so pugnacious that they often kill each other, suffer from possessing certain ornaments. Cock-fighters trim the hackles and cut off the combs and gills of their cocks; and the birds are then said to be dubbed. An undubbed bird, as Mr. Tegetmeier insists, "is at a fearful disadvantage; the comb and gills offer an easy hold to his adversary's beak, and as a cock always strikes where he holds, when once he has seized his foe, he has him entirely in his power. Even supposing that the bird is not killed, the loss of blood suffered by an undubbed cock is much greater than that sustained by one that has been trimmed."* Young turkey-cocks in fighting always seize hold of each other's wattles; and I presume that the old birds fight in the same manner. It may perhaps be objected that the comb and wattles are not ornamental, and cannot be of service to the birds in this way; but even to our eyes, the beauty of the glossy black Spanish cock is much enhanced by his white face and crimson comb; and no one who has ever seen the splendid blue wattles of the male tragopan pheasant distended in courtship can for a moment doubt that beauty is the object gained. From the foregoing facts we clearly see that the plumes and other ornaments of the males must be of the highest importance to them; and we further see that beauty is even sometimes more important than success in battle.

* Tegetmeier, The Poultry Book, 1866, p. 139.