

"Eclipse Plumage," possibly a Universal Factor in the Sequence of Moults in Ducks.

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THE eclipse plumage in ducks is regarded by some authorities as a plumage of inconspicuous hues designed to aid the drakes in concealing themselves during that period when they have moulted all their wing feathers and are unable to fly. By others, however, it is regarded as a winter or non-breeding plumage as distinct from a summer or nuptial plumage.

If this latter view is correct, and I believe that it is, then one would expect that other species as well as those whose males have a brilliant nesting dress would undergo a double moult. The Grey Duck of New Zealand (*Anas superciliosa*) and the Black Duck (North-eastern America, *Anas rubripes*) may be taken as typical of those ducks in which the male and female have the same colouring throughout the year. In his "Life Histories of North American Waterfowl" (*Bulletin 126, United States National Museum*) A. C. Bent, dealing with the Black Duck, says: "I have often been asked if the Black Duck has an eclipse plumage with the double moult common to all the surface-feeding ducks. The eclipse plumage, if it had one, would not be conspicuous and the double moult could be detected only by dissection or close inspection. It begins to moult very early in the summer and is in more or less continual moult for three months or more, but, as there is no necessity of an eclipse plumage for concealment, I doubt if there is an actual double moult. Lord William Percy, the British expert on ducks, tells me that none of the ducks in which the sexes are alike have an eclipse plumage; probably he is correct in this statement. The Black Duck then has probably only one moult, the post nuptial, which is prolonged and complete."

For many years I have thought that the Grey Duck had an eclipse plumage because I found freshly moulted feathers in the ducks' haunts throughout the winter. Further, if the double moult in the male was not especially for purposes of concealment, but was to give him "breeding" and "non-breeding" dresses, then it seemed to me probable that the females would have a double moult also. To settle the matter one could choose no duck better than our Grey Duck, but the birds selected for experiment must be pure—there must be no trace of Mallard cross in them. In January last I found the birds I wanted in Auckland—they were pure Grey Duck kept for the Acclimatisation Society in a large covered enclosure by Mr. F. G. Newell. On January 18th some of these birds were heavily in the moult, while some had just completed it, being in perfect plumage with not a frayed feather on them. Selecting two drakes and a duck of these latter, I trimmed with a pair of scissors patches of feathers on the breast, belly, hind neck and top of the head; I further clipped the ends off all the larger scapulars, and squared

the ends of the primaries of one wing. With Mr. Newell's assistance I ringed the legs of these birds for identification and went back to look at them on August 11th. In both of the drakes all the feathers I had marked had been replaced by new ones save the primaries, while the duck still retained one clipped scapular as well as the clipped primaries. Mr. Newell told me that new feathers began to replace clipped ones within six weeks, the marks on the neck and breast being first effaced. As these birds had not completed their post-nuptial moult by more than a fortnight when I clipped them, the post-nuptial dress is worn for only about two months. The replacement feathers in both moults are the same as the moulted ones, and there would be no difference in the plumage of a Grey Duck when it had completed its post-nuptial moult in January or its pre-nuptial moult in August. This applies to both sexes. Here, then, is definite proof that the Grey Duck has an "eclipse" plumage, although in no need of one for purposes of concealment, and I have no doubt that the long moulting period of the American Black Duck described by Bent is in reality two complete changes of plumage.

The discovery of the double moult in the female Grey Duck is very interesting, for it indicates that a double moult is probable in both sexes of those species in which the drake has an eclipse plumage, but as the change of plumage is not accompanied by any change of colouring, it has not been observed. It could only be detected with certainty by marking birds and keeping them under observation. It indicates also the possibility that many other ducks which are to-day regarded as having only one moult annually may actually have a double moult, without any change of colouring.

Of the Ruddy Duck (*Erismatura jamaicensis*) of North America it is said in Bent's book: "The Ruddy Duck is one of the very few species which have a strictly nuptial plumage and two extensive moults." I believe that when more species are carefully examined it will be found that this procedure is the rule rather than the exception, though the two moults may not be spaced as far apart as in the Ruddy Duck.

The case of the Paradise Duck (*Casarca variegata*) is especially interesting. It is a very general rule in the bird world that where the adult sexes of a species differ in colouration, the young in their juvenal plumage resemble the hen, and to this rule the Paradise Duck is one of the outstanding exceptions. In their juvenal plumage all the young resemble the adult drake, having black heads and dark vermiculated feathers on the back and breast. In their first moult, which occurs when they are about four months old, the females get a white head and ruddy feathers on the back and breast, while the drakes retain their juvenal colouring. Now it is the drakes of most species which exhibit the greatest change from the juvenal to the adult plumages, and it is the drakes which, in the eclipse plumage, revert towards their juvenal colouring. In the Paradise Duck the position of the sexes being reversed, it is interesting to find that the duck has an "eclipse" plumage while the drake has not. She retains the white head, but the ruddy feathers of back and breast give way to dark feathers as in the drake. Her moult into "eclipse"

is completed in a short time early in January, and by early March she begins to grow her red "summer" feathers, but she does not complete this moult until July or August, ready for the nesting season which commences in September.

I expect to find that the Paradise Drake also has two moults, although he does not change his colouring.

The sequence of the moults in those ducks in which the moult is unaccompanied by a change of colouring would be very difficult to follow in wild birds; it is therefore fortunate that a great many species of ducks are kept pinioned on ponds for ornamental purposes. I suggest that a close study of these will lead to the discovery that many more species of duck, both male and female, indulge in a double moult than is at present suspected.

