

NOTES ON THE MOULTS AND SEQUENCE OF PLUMAGES IN SOME BRITISH DUCKS.

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THESE notes are based on an examination of the specimens in the Tring Museum, the Natural History Museum South Kensington, Mr. H. F. Witherby's collection and my own, of the following species :—Mallard (*Anas p. platyrhyncha*), Gadwall (*A. strepera*), Teal (*A. c. crecca*), American Green-winged Teal (*A. c. carolinensis*), American Blue-winged Teal (*A. discors*), Garganey (*A. querquedula*), Wigeon (*A. penelope*), American Wigeon (*A. americana*), Pintail (*A. acuta*), Shoveler (*Spatula clypeata*), Common Pochard (*Nyroca f. ferina*), Ferruginous Duck (*Nyroca nyroca*), Tufted Duck (*Nyroca fuligula*), Scaup-Duck (*Nyroca m. marila*). Owing to absence in many cases of material required I have been unable to follow out in every detail the sequence of the plumages and moults of all these species, but the facts elucidated during the course of my examination of this material seem of sufficient interest to warrant their being recorded without further delay.

The only work that I am aware of which deals with the sequence of plumages in the surface-feeding ducks is Mr. J. G. Millais's charming monograph of the group, viz., *The Natural History of British Surface-Feeding Ducks*. While appreciating the author's endeavours in the task of unravelling the changes of plumages and moult, I am unable to corroborate his views on the part played by "colour change." It will be remembered that Mr. Millais explains the assumption of various plumages, eclipse, winter, etc., by a moult in conjunction with colour change or repigmentation of the feather. The evidence derived from my examination of many skins and specimens in the flesh has firmly

convinced me that in the sequence of plumages in the ducks, "colour change" plays no part, and that the different plumages are simply and naturally acquired by a moult only. This is as one would have expected, especially after a perusal of Mr. R. M. Strong's valuable paper on the *Development of Colour in the Definitive Feather*, which demonstrates that all the histological conditions render the possibility of the repigmentation of the feather highly improbable.

Perhaps the most interesting fact I have to record is that female surface-feeding ducks in spring have a complete body-moult, the tail and inner secondaries also being involved. The down, too, is shed and replaced by the usual down, and in addition by a luxuriant down much longer and coarser than the ordinary down. Mr. Millais has apparently overlooked both these moults, and there seems to be no mention of them in literature. The fact that the female Long-tailed Duck moults its whitish winter down and acquires just before the breeding-season an almost black down was first discovered by Dr. E. Hartert, who told me about it. Subsequently I discovered that the females of the surface-feeding ducks and those of the genus *Nyroca* also acquired a special down just before the breeding-season. Female *Tadorna tadorna* also have a down moult in spring, but my investigations of the moults of this species are not yet complete. This down is evidently used for embedding the eggs in during incubation, and has been designated "nest down" by Dr. Hartert, a term I propose to use in describing it.

The only remark Mr. Millais makes about the spring moult of the female is as follows: of the adult female Mallard (*op. cit.*, p. 27) he says that "late in the spring (May, in fact) . . . there is sometimes a slight influx of new feathers on the breast, especially where the bird has heavily plucked herself of both down and feathers for the 'building up' of her nest. The whole plumage then (by means of a colour change) becomes much darker,

especially about the head, breast, and scapulars, and the spots, which in the winter were hidden under the feathers . . . work down to the surface." In dealing with the remaining species no reference at all is made to moult, though attention is called to changes by abrasion; *e.g.*, in referring to the spring plumage of the adult female Teal, p. 88, he says: "during the winter the breast is white, concealing the spots which work down and appear in the spring." In some cases while a change in the plumage is noted, no explanation is given of how this change is brought about, and the reader is left in doubt whether it is to be attributed or not to "colour change" as is more or less implied by the author. For example, of the female Gadwall, p. 37, he says: "In the summer the whole plumage becomes very much darker; the black-brown upper-parts of the back and scapular feathers work more to the surface, and their light edges are duller and narrower. The breast, too, for the greater part, becomes heavily spotted, particularly so towards the vent." More instances might be quoted, but these, I think, are sufficient to show that the probability of a spring-moult had not been considered by the author.

What makes this spring-moult all the more interesting is the fact that with one or two apparent exceptions named overleaf it does not take place in the male; a few body-feathers may be grown in here and there, but there appears to be no general moult. Of course, there is a possibility, but I think a remote one, that specimens showing moult have not found their way into the collections mentioned; but I think this is most unlikely, as of the common species such as Mallard, Teal, and Wigeon, a large series of spring specimens was examined. Moreover, I have also examined specimens in the flesh, and in some cases have had both sexes sent to me obtained on the same date, the male with no trace of moult whatever, the female moulting heavily.

The apparent exceptions to this statement are Gadwall, Shoveler, and Blue-winged Teal. Some of the spring male Gadwall examined were in fairly full body-moult, though none showed any wing- or tail-moult, while from the worn and abraded specimens occurring in May, I am convinced that this moult does not take place in each individual and is probably of irregular occurrence, in some birds not taking place at all, while in others it may occur to a greater or lesser extent. Whether first-winter Gadwall (which are easily distinguished from adult winter ones by the different colour of the wing-coverts) have a partial moult in spring or not is difficult to say. Some birds only completely attain their first winter-plumage by March or April, and the possibility of their then commencing a spring-moult is most unlikely, though those which attain their first winter-plumage earlier may do so. One or two February specimens were found to be in moult, but it is difficult to say whether these specimens were completing their first winter-moult (I think this the most probable explanation) or commencing a spring-moult. As regards the male Shoveler, many spring specimens were handled, but only two adult males were found to be in moult: one dated March 28th, Texas, in the collection of the Natural History Museum, South Kensington, was moulting fairly heavily all over the body, but not the tail or wings; the other, dated April 2nd, was moulting on the upper-parts only. No other adult male in moult was discovered, which is fairly conclusive evidence that a spring moult (apart from the renewing of a stray feather or two) in this species, in the adult at least, is an unusual occurrence. Young males, on the other hand, may be found moulting throughout the spring months, and while some do not attain the plumage resembling the adult till April or May others do so by February or March, and may have a partial spring-moult in April or May. Three males of the Blue-winged Teal, out of the series examined,

were in moult, viz., one March 26th moulting a little on the head, mantle, breast, and belly; one March 29th moulting a feather or two on the breast and mantle only; and one April 12th moulting heavily on the breast. One adult male, Garganey, March 5th, out of a good series, was moulting on the head, neck, mantle and one tail-feather, and one March 6th was moulting on the upper-parts only. This list comprises all the spring males found in moult—fairly conclusive evidence surely that a spring-moult in the male is an unusual occurrence.

While I feel that at this stage it is too early to theorize, one cannot reflect on this question of the spring-moult of the female and its practical absence in the male without wondering if the so-called eclipse-plumage of the male represents the winter-plumage, while the adult winter-plumage which is acquired, as will be seen, by a moult similar in the parts involved to that of the female in spring, represents the summer-plumage. Whether there is anything in this suggestion or not, the collection and careful examination of moulting specimens alone will decide.*

The sequences of plumages in the ducks may be classified as follows:—

	Nestling.
	Juvenile.
Adult Winter.	First Winter.
Adult Summer.	First Summer.
Adult Eclipse.	First Eclipse.
	Second Winter, etc.

These terms are fully discussed and explained in *British Birds*, Vol. III., p. 211. The first eclipse-plumage is, as its name implies, the first eclipse to be assumed by the young bird and appears in most cases to be identical with the adult eclipse, though details of moult are possibly different. From the following notes

* For other reasons Mr. W. P. Pycraft has made the same suggestion (cf *Bull. B.O.C.*, xxxiii., p. 67).—EDS.

it will be seen that while first winter birds of some of the species are almost indistinguishable from the adults, others are differentiated by their wing-coverts which are of the juvenile plumage, *e.g.* Gadwall, Wigeon, etc.

The following is a brief summary of the moults and sequence of plumages in the

SURFACE-FEEDING DUCKS.

Adult male. Winter.—This plumage is acquired by a complete body- and tail-moult, and the innermost secondaries are also moulted, but not the rest of the wings (unless the inner secondary coverts are moulted, but I have seen no specimen showing this). The moult may commence at the end of July or in August (Mallard and Wigeon) or later (Pintail) and may be completed as early as the end of September or beginning of October (Mallard) but often not till November (Wigeon) or even later.

Adult male. Summer.—No general moult, but body-feathers here and there may be renewed (exceptions, Gadwall, Shoveler and others previously mentioned, see p. 37). Plumage as in winter but in some specimens very abraded.

Adult male. Eclipse.—This plumage is acquired by an apparently complete body-moult and by a complete wing-moult, while in Mallard, Wigeon, Pintail and possibly in other species the central pair of tail-feathers (in the Mallard usually the two central pairs) are moulted and replaced, in the Mallard by uncurled sepia feathers, in the Wigeon by shorter less-pointed feathers, and in the Pintail by mouse-grey feathers slightly pointed but not extending more than about one and a half inches beyond the next pair of tail-feathers.* The other tail-feathers are not moulted until the commencement of the next moult, but occasionally a pair or two may be found in quill before the appearance of the first winter feathers. The wings may be shed at the commencement of the moult into eclipse or towards the end of the moult and may still be in quill at the commencement of the following moult into the winter-plumage. The male in eclipse is usually described as resembling the adult female, but this statement is not applicable to all the species, and the eclipse plumage

* Mr. Millais states in *British Diving Ducks* (Vol. I. page 3) that the central tail-feathers in the Mallard only moult once a year, whereas as shown above they moult twice a year. This misconception of the moults has, it would appear, led Mr. Millais to believe that these feathers actually change colour.

is more correctly described as being a mixture of that of the juvenile male and the adult female, though in some species it is distinct from both. The eclipse Mallard, Teal and Garganey resemble the juvenile male on the head and upper-parts, while the under-parts are like those of the adult female; in the Pintail the eclipse plumage of the upper-parts is quite distinct from both, though the head and neck resemble the juvenile male and the under-parts the adult female.

Adult female. Winter.—This plumage is acquired by a complete moult. Apparently the remiges are all dropped together as in the adult male, but I have only been able to examine three specimens showing wing-moult, viz., one Mallard, July 1st, and one October 2nd with remiges all in quill, and one Teal, ditto, May 1st.

Adult female. Summer.—The body-plumage, tail, and innermost secondaries and down are completely moulted from February to May. In the Mallard this plumage is the same as the winter; in the Teal the upper-parts are darker and the under-parts more spotted; in the Garganey the feathers of the upper-parts have much broader buff edges and the same applies to the Shoveler, which has also more plentiful buff markings on the upper-parts. In the Pintail and Wigeon the plumage appears to be the same as in winter. No spring or summer specimens of Gadwall have been examined. Towards the end of this moult the down moult commences. In the ducks there is a well-developed down, apart from the downy filaments which the barbs of the contour feathers degenerate into towards the base of the feathers; in the female this down is moulted in spring and replaced by a similar down and in addition by a much stronger and more luxuriant down, which does not seem to differ in structure microscopically except in its much greater coarseness. In a female Teal in my collection, both downs are in sheath, and it is of interest to note that they emerge from separate *papillæ*. This "nest" down is easily recognised from the normal down by its much greater length, by the strength of barbs and barbules (the latter being very plainly visible to the naked eye), by its silky, almost plume-like, appearance, and by its different colour.

In the Mallard, the ordinary down is grey, the "nest" down black; in the Teal and the American Green-winged Teal the ordinary down is ashy-brown, the "nest" down black with faint buff tips; in the American Blue-winged Teal the ordinary down is pale ashy-brown, the "nest" down blackish-

brown, tipped light buff; in the Garganey the ordinary down is ashy-brown, the "nest" down blackish-brown, tipped light buff; in the Wigeon and the American Wigeon, the ordinary down is ashy-brown, the "nest" down blackish-brown tipped white; in the Shoveler the ordinary down is ashy-brown, the "nest" down blackish-brown with faint white tips; in the Pintail the ordinary down is ashy-brown, the "nest" down black. Apparently this "nest" down is used to line the nest with, and in late summer females which have bred, very little, if any, remains.

Nestling.—It is interesting to note that nestlings of the different species have the same general colour pattern, though in some of the species the colours comprising the pattern are slightly different.

Juvenile.—The juvenile plumage more or less resembles that of the adult female, but is always distinguishable and in most cases the sexes are slightly different.

First winter. Male.—Resembles the adult male, and in Mallard, Teal, and Garganey is hardly distinguishable from it; in Gadwall, Pintail and Wigeon, the first winter male is distinguished by the different colour pattern of the wing-coverts. This plumage is acquired by a complete body- and tail-moult, some innermost secondaries and usually their coverts but not the rest of the wings (exceptionally some of the median coverts are moulted in some specimens of Wigeon and American Wigeon examined).

The period of moult from juvenile to first winter plumage varies in the different species, as well as individually, some juvenile birds of the same species attaining the first winter plumage before January, while in others the moult is slow and irregular and the plumage may not be completed till April or later, while in some cases the moult is never completed, and some juvenile body-feathers (frequently those of the back and rump) are retained all through the summer.

First winter. Female.—Resembles the adult female. In the first winter Mallard the back and rump are less glossy; first winter Teal are very similar to adult; while first winter Gadwall, Garganey, and Shoveler are distinguished by the wing-coverts. Moult as in the male.

First summer. Male.—No general moult but a few body-feathers may be renewed. (For possible exceptions to this statement see pages 37 and 38.) Plumage as winter.

First summer. Female.—Moult apparently as in adult female, and new plumage as adult female.

First eclipse.—Probably as adult eclipse, but the details of moult, which from absence of material I am unable to furnish, are possibly different.

Second winter. Male and female.—Not distinguishable from the adults and the moult is probably the same.

THE GENUS *NYROCA*.

The sequence of plumages and moults in the genus *Nyroca* appears to be very similar to that of the surface-feeding ducks, but I do not propose to deal in full with it at present, beyond stating that female Pochard, Tufted Duck, and apparently Scaup, have as complete a spring-moult as do the female surface-feeding ducks, and also acquire just before breeding commences a special “nest” down in addition to the ordinary down, which is also renewed at this time. In the Pochard the ordinary down is ashy-grey or light ashy-brown, the “nest” down is black; in the White-eyed Pochard the ordinary down is pale ashy, the “nest” down black-brown, buffy-white towards the tip; in the Tufted Duck the ordinary down is ashy-brown, the “nest” down black, brownish-black towards the tip; in the Scaup the ordinary down is ashy-brown, the “nest” down black.

In conclusion I wish to thank Lord Rothschild, the authorities of the Natural History Museum, South Kensington, and Mr. H. F. Witherby, for kindly permitting me the use of their collections.