

Eclipse Plumage

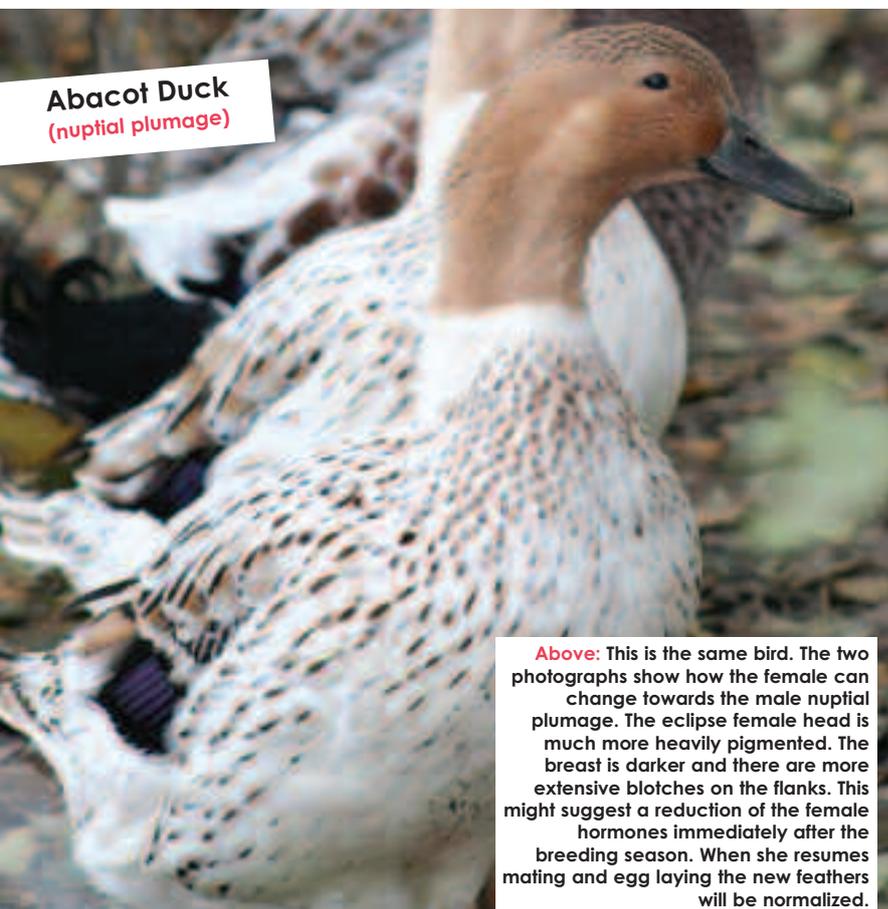
in Domestic Ducks

by Mike Ashton, Waterfowl Correspondent



In summer, something very strange happens to the ducks. They appear to change sex! Don't let it worry you, but it happens to most species of ducks in the northern hemisphere. Shortly after the breeding season, the male moults and takes on a plumage similar to the female's. Even the youngsters do it—all of them. When they have lost the fluffy down and feathered up for the first time, it is very hard to tell which are the young ducks and which are the young drakes. In their 'juvenile' plumage they all look much alike. With a bit of practice, you can spot the males by the slight difference in the bill colour and slightly darker patches on the rump. So what's going on here, and why do they do it?

It begins in the early summer and lasts until the second moult of September (for the adults). They call it the 'summer' plumage or the 'eclipse'. The drake ceases his posturing and fighting. He loses his bright nuptial livery and he skulks in a drabber than drab feather form. In fact, he deserts the female, who is now preoccupied with her brood, and retires into seclusion, either by himself or with a gang of male cronies down the river. I almost said 'down the pub'. He has lost it. No sex appeal. Nothing to strut about. All he can do is sulk and try to stay out of trouble.



And that is the nub of it. I suppose there is no point in being conspicuous and flashy if the girlfriend is no longer interested. All that lustrous green head, sharp white collar and rich claret bib—all it would do is attract the predators! What the girls have learned, during the millennia of evolution, is to blend in to the background. They are well equipped with camouflage pattern feathers to sit out the incubation amongst the reeds, branches and grasses. Like hen pheasant, they can sit still and watch the fox or human go by. Only those males that evolved the same strategy have managed to survive.

This phenomenon is most apparent in ducks that have noticeable 'sexual dimorphism' in plumage colour and markings—the males are radically different from the females. Mallards are the classic example, and this involves most domestic ducks. They are really just mallards too. So, if you have Rouen Ducks, Silver Calls or Trout Runners, you will have seen this 'eclipse' take place every year. Funnily enough, something also happens to the females. They go a bit darker and blotchier during this period. If anything, the two sexes seem to get a little closer together in appearance, if nothing else.

Above: This is the same bird. The two photographs show how the female can change towards the male nuptial plumage. The eclipse female head is much more heavily pigmented. The breast is darker and there are more extensive blotches on the flanks. This might suggest a reduction of the female hormones immediately after the breeding season. When she resumes mating and egg laying the new feathers will be normalized.

Below: The Bibbed Hook Bill drake shows elements of the eclipse plumage even at the beginning of October. There are still some pencilled feathers very similar to those of the duck. The young (Dark Mallard) Hook Bill on the next page has smooth grey flanks typical of male nuptial plumage. Hook Bills are very slow to lose the eclipse and the adult males are often unfit for showing for most of the season. Young males in their first adult feathers are the best choice for exhibition.



Bibbed Hook Bill Drake
(in eclipse)

Arthur Walton's 1937 paper 'On the eclipse plumage of the mallard' gives a clear account on the major changes in the drakes. They 'involve alteration of shape (tail centrals), decrease in pigmentation (under tail coverts), increase in pigment (flank), change from vermiculated to self-coloured (flank and scapulars), increase in brown pigment (breast, flank, belly and vent), loss of iridescence (neck), increase in regional differentiation (dark streak through the eye) and decrease in regional differentiation (loss of white neck ring).' It is a most sophisticated and complex process. I suppose we can speculate 'why' it happens, but it is even more fascinating to enquire about 'how' it happens.

Just a little story first: some years ago our glamorous Tina (short for Argentina), the beautiful Silver Call, lost her looks. ['argent' = 'silver' (get it?)] Her head went dark; she developed a white neck ring and claret chest. She even stopped quacking quite so much (mercifully) and she grew slightly curled tail feathers like the males. In appearance, she genuinely changed sex. The question is why should this occur and what had happened to her body chemistry? It's all to do with the endocrine glands, those that secrete hormones. Birds have only one working ovary. If that is damaged or diseased, it ceases to produce female hormones such as oestrogen, and it is these hormones that actually cause the ducks to have their female plumage. Strange as it may seem, the male plumage is the 'default'. It does not matter if the male is producing his hormone (testosterone) or not. His winter plumage will remain the same.

OK, so why does the male change to female in summer? If he has the default plumage that is unaffected by his male hormone, why does he go 'all girly' out of the breeding season? One reason I quoted Arthur Walton's Cambridge paper was to look at some of the early work on this very question. In, by modern standards, quite rough and ready experiments, Walton looked at the influence of artificial light on some drakes and castration on some others. It does not sound very appetising and a few actually died during the operation. Nonetheless, the results were quite interesting.

By increasing the duration of light (put on at dusk until 11 pm), drakes were encouraged to go into first moult some months ahead of a control group that had no artificial lighting. The eclipse lasted from early February until mid May. Normally it would be from mid July until mid September.



Appleyard Drake
(in eclipse)



Left & Above: The Silver Appleyard males tend to become more grizzled in the head and neck plumage. Their flanks are darker and more mottled. Most breeds of duck, which have contrasting plumage for males and females, show some degree of eclipse in the summer months.

Appleyard Drake
(nuptial plumage)

Thereafter the birds would attain normal nuptial plumage. So it would seem that exposure to light is the 'trigger' for the eclipse process. Is it the drake's sensitive skin or his eyes that register the increase in lighting times during the summer months? Then what happens to his body chemistry?

In 1916, H D Goodale worked with Rouen ducks, which are almost identical to the wild mallard in plumage and undergo a similar if not quite so well-marked eclipse. Goodale claimed that by removing the testis on both sides of the body of juvenile and adult drakes (normal or eclipse plumage) there was a 'definitive assumption of normal plumage at subsequent moultings and the birds did not show any seasonal change. Incomplete or unilateral castration did not affect the plumage changes [Walton].' As long as there was no regenerated tissue, Walton also found that castration 'did not prevent the

assumption of eclipse in the first year but did so in the second.'

So, if removal of testosterone (the male hormone) has no effect on the normal male plumage, why on earth should it stop the effeminate eclipse plumage? One would have thought that it would involve female hormone, not male hormone! Perhaps we could learn something from the chickens.

Significant research in the 1980s showed how Sebright and Golden Campine male fowl had 'hen feathering'. Counter to the normal assumption that the male phenotype in this area is the default, how can male Sebrights look like females and still have all the other male functions? If they are sexually active, fertile and still generating male hormones, why do they look like hens? Wolf in sheep's clothing or trans-sexuals?

Dark Mallard Hook Bill Drake (in nuptial plumage)



It seems counter-intuitive, but the male hormone in Sebrights actually causes the production of female hormone. F W George and his fellow researchers have shown that testosterone can be converted into 17β -estradiol in the skin of the male birds. Without testosterone they remain 'cock feathered'. With the male hormone they are able to metabolize extra female hormone and thereby adopt the female plumage pattern. Amazing!

In Sebrights and Golden Campines, a specific gene has been identified, the autosomal dominant (though sex-limited) 'hen feathering' gene (Hf). Sebrights and Golden Campines are expected to be homozygous for this gene (Hf/Hf). Other breeds are expected to be homozygous for the alleles that allow cock feathering (hf/hf).

But is this what happens in drakes and young ducklings? What are the mechanisms that make drakes and

ducklings 'duck feathered'? As early as 1908 C W Beebe kept Scarlet Tanagers and Bobolinks in dark confinement. They retained their nuptial plumage all winter and summer long. In 1911 J C Phillips kept Mallard call ducks in the fridge! In a cold storage room actually, with a temperature range of 22-30 degrees Fahrenheit, though mainly around 25 degrees. 'It was practically dark, though lighted at times with electricity.' They too showed no sign of eclipse and retained their normal nuptial plumage. The disappointing thing, however, is that he failed to give his control group the same amount of lighting, therefore making it impossible to assert whether the cold itself had any effect on the lack of summer moult. We are left with the obvious question: is it something to do with prolonged exposure to sunlight that brings on the eclipse? If so, where are the light receptors (in the skin or in the eyes)? What is the actual process that activates the hormones?

A more up to date article by Owens and Short, 'Hormonal basis of sexual dimorphism in birds' (Tree vol.10, 1995), looks at the hormones acting on plumage and behaviour in many species of birds. The main focus though is on sexual selection (sexual characters as signals of quality). They point out that the problem is not new. People were wondering about the 'sex-change' of Lady Tynte's peahen back in 1780, yet the exact process of how the male duck seems to go back and forth (during the course of a single year) between male and female attire is still somewhat mysterious. The amount of light, or the length of exposure, the sense mechanisms and body chemistry are rather vague; unless, that is, someone has been researching the problem of 'summer plumage'. Call it 'eclipse' if you like, but more light needs to be shed on the problem.

Mike Ashton

www.ashtonwaterfowl.net

Call Ducks, Indian Runner Ducks and Domestic Geese in the UK