

HOW TO BREED THE CLEARWING BUDGERIGAR.



Photo of superb heritage clearwings – a dark green and a violet.

The original (Australian Heritage) Clearwings are breathtakingly beautiful budgerigars. Even people who have no interest in budgies swoon at the sight of a stunning Australian Heritage Violet Clearwing with its snowy white wings and deepest violet body colour.

However, Clearwings are almost certainly the most difficult and frustrating of all budgerigar varieties to breed to a high exhibition standard. They break people's hearts. In general, most of the top breeders of exhibition budgies simply steer well clear of these oh-so-difficult birds. Hence my attempt in this article to try to work out why people have such trouble with Clearwings, and whether or not the trouble can be fixed.

For over 80 years the Clearwing variety of budgerigar has been regarded as a separate mutation occurring as one of the (dil locus) allelic series which includes normal, dilute, greywing and, of course clearwing.

Armed with this theory, it should have been a relatively simple task to breed genuine clearwings all over the world. Clearwings were sent overseas (mostly to the UK.) from Australia from the 1930s onwards until around 1960.

True mutations (ie genes) always segregate in various ratios in crossbred progeny – if not in the first hybrid generation, certainly in subsequent generations. So clearwings crossed to greywings or normals should have produced identifiable clearwings within 2 or 3 subsequent generations of backcrossing.

This didn't happen. After 80 years of trying, true clearwings still seem almost exclusively confined to Australia – and even then mostly in more or less pure strains of clearwings that trace back to the original 1930s birds. Somewhat similar birds do occur in Europe and other countries, and tiny numbers of what may be true clearwings also exist in some areas outside of Australia. In the UK, their best clearwings have excellent body colour but very grey wings. Many European "clearwings" are obviously dilutes with slightly darker body colour than other dilutes. In general, really well coloured clearwings ie with clear wings, are confined to Australia.

Why?

It is proposed here that the multiple allele theory is incorrect: certainly it has failed to produce the results that the theory predicts. My research clearly shows how the multiple allele theory leaves the clearwing breeder unprepared and unable to reliably breed clearwings after any outcrosses have been done. That is you pretty much burn your bridges when you currently outcross the original Australian clearwings.

Here we will look into two different aspects of the clearwing controversy:

1. The historic evidence for the development of Clearwings and the subsequent implications for the hereditary basis of this colour pattern.
2. The results of my current test matings over a fifteen year period.

This method of coming at the same problem from two totally different angles will, I believe, show that both scenarios support the same theory: that clearwings are the result of modifying the greywing mutation. That is, that no separate mutation for clearwing exists. Furthermore, once you throw out the multiple allele theory, breeding beautifully coloured Clearwings becomes far easier.



This is the best-coloured clearwing that I have ever bred or seen. Almost always, clearwing hens are significantly clearer on the wings than the cocks are. This current year Sky Blue Heritage Clearwing cock is perfectly clear.

1. The Historic Evidence

On page 123 of the first (1933) edition of 'Budgerigars in Bush and Aviary', Neville Cayley quotes the breeder who developed the clearwing variety, Mr H. E. Peir of Peakhurst in Sydney as saying: "I have produced....., **greywings** in olive, royal blue (deep cobalt), mauve and sky blue".

Peir's key birds are illustrated (see illustration below) in full colour paintings by Cayley opposite page 90 as: greywing cobalt and **greywing** (royal) cobalt. The two greywing birds have identical grey wing colour, but the Royal blue (deep cobalt) has very intense body colour, equal to that of a normal. These intensely body-coloured **greywings** were to go on to become the brilliantly coloured **Clearwings** of the future.

It is worth noting that Neville Cayley is perhaps the greatest of all of Australia's bird artists, writing the words and painting all the exquisite water colour illustrations of the bird species in the spectacular book 'What Bird is That?' He was also one of the leading budgie breeders of his day and a pioneer of our original Budgerigar Club. His paintings were **very accurate** indeed. He did not get his colours wrong. He also painted the first Budgerigar Standard of Perfection for the fledgling Australasian Budgerigar Council in 1936.

It is clear that everyone was astonished by these richly body-coloured greywings, so much so that as a matter of great pride, a pair of these "Royal Blues" (ie presumably cobalt Clearwings as they would eventually be known) were despatched to Mother England to be presented to His Majesty King George V by the NSW government. These were accepted by the King for inclusion in his royal aviaries in 1935 and thus the name of "Royals" for these intensely coloured birds became established. They were also known as "Austral's".



Reading from left—White cobalt; greywing cobalt; greywing (royal) cobalt; cobalt.

PROOF THAT CLEARWINGS ARE NOT THE RESULT OF A SEPARATE MUTATION.

This original painting from opposite page 90 of the 1st edition in 1933 of Neville Cayley's book 'Budgerigars in Bush and Aviary' shows one White and three Greywings. The middle Greywing is called a "greywing (royal) cobalt" to distinguish it from the common Greywing cobalt to its left. NOTE that the wing markings on both of these Greywing cobalts are an identical shade of grey. The only thing that distinguishes these two birds from each other is the depth of their body colour: to repeat, wing colour does not come into it. Remember that Cayley was present as clearwings were being developed by Harold Peir. NOW look at the same picture in the 1935 edition of the very same book.

By the time of the 2nd (1935) edition of 'Budgerigars in Bush and Aviary', the thinking and vision had changed: so superb were the colours of these deep body-coloured greywings that in the very same painting (and also on page 90), the exact same greywing (royal) cobalt had its name changed to "**Whitewing** Cobalt" (see illustration below). Harold Peir had realised that, if they accentuated the wing/body colour contrast with some careful breeding, the royal greywing could be turned into a work of fine art. Their vision was to make the wing colour as white as possible to produce the Whitewing: so they changed the name accordingly. This inspired vision rather than one single gene mutation created the Whitewing....and subsequently the Yellowwing.



Reading from left—COBALT WHITE, GREYWING COBALT,
WHITEWING COBALT, COBALT

This is the picture from opposite page 90 of the 1935 2nd edition of Cayley's book. Note that it is exactly the same picture as is in the 1933 edition, but now, the "**greywing (royal) cobalt**" has had its name changed to "**Whitewing cobalt**". Nonetheless, this cobalt bird still has the same grey wing pattern as before. Whitewings were an inspired dream, not a separate mutation. QED. For the record, Harold Peir bred his Clearwings in specialised Clearwing colonies in large aviaries; he never used individual breeding cabinets. He culled unwanted birds, selecting for better colour or size and shape by simple old-fashioned bit-by-bit selection: the development of Clearwings was accomplished by what we now call modifier elements.

The proof of this theory lies on page 84 of Cyril Rogers' book 'World of Budgerigars' (5th edition revised by James Blake). In reference to "Royal Blue" Budgerigars, Rogers quotes Neville Cayley, Chair of The Budgerigar Club of New South Wales: "These birds are classified as Greywing Cobalts and the strain is popularly known as Royal Blues.....Mr Peir has definitely established a strain of birds with pure cobalt blue body colour, and is at present experimenting in the production of a strain of bicoloured birds possessing the same intensity of body colour but with white wings and upper parts. He states that the period occupied in producing and establishing his Royal Blue strain of budgerigars was seven years."

Neville Cayley adds strong support to this argument by stating on page 46 of 'Budgerigars in Bush and Aviary': "In the forefront of the many varieties of Budgerigars, noted for beauty of colouration and contrast, are the Yellow-wing Greens and the White-wing Blues. These birds are the product of **blending inheritance** and keen selective breeding." Cayley was there in Harold Peir's aviaries at the time of the development of the very first clearwings – so he should know.

What a superb imagination and what outstanding breeding abilities must the inventor of the CLEARWING have had. Invented by Harold Peir and perfected by Harley Yardley of Fivedock in Sydney.



Photo of a dark green heritage clearwing.

In 1957 as a wide-eyed 10 year old Budgerigar Society member, I tagged along with senior budgie breeders on a visit to Harley Yardley's aviaries. I was gobsmacked by his aviaries full of Blackeyed yellows and Clearwings in particular. This vision still drives me to this day. After Harley's premature death, Harold Newbury passed on some of Harley's best clearwing stock to me: I had absolutely no idea of the heavy responsibility that this was. I was then 13 years of age and had no idea of the enormous compliment and honour that this was. I was just a scruffy kid passionately in love with Clearwings. Maybe Newbury and Yardley saw this passion. To this day I regret that I never went back to visit Harley's aviaries after my initial visit – as a kid I knew my place and I never had the courage to ask.

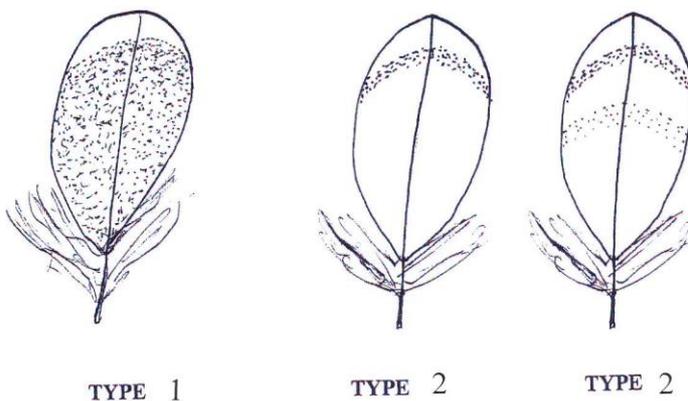
But what did these pioneers of the Clearwing budgerigar do? How did they create the Clearwing? Well we know that they accidentally discovered a gene mutation for very intense body colour in Greywings; this is very clear in Cayley's paintings and words in 'Budgerigars in Bush and Aviary'. This intense body colour turned out to be the result of a dominant gene that affects greywings and probably dilutes as well. It is a tribute to the UK clearwing breeders that the dominant intense body colour gene is present in the best UK clearwings to this day. Sadly, elsewhere in Europe, this intense body colour gene appears to be missing from their clearwings.

On the 11/9/2015, I interviewed Harold Peir's grandson, Richard Henry Peir on the origin of his grandfather's Clearwings in the early 1930s. Richard stated that he was very interested in his grandfather's budgies and he helped feed them and clean out the aviaries. He was acutely aware of the development of the "Royal Blue" budgies which was accomplished by putting selected birds into separate aviaries to breed naturally. Harold neither owned nor used breeding cabinets.

Richard observed his grandfather selecting for ever-better coloured clearwings over a number of years. He was adamant that no original mutation turned up, but rather that, by gradual selection, the colour contrast of the Clearwing gradually evolved (see later on for clarity of wing colour).

Next it seems that Harold Peir crossed his early Blackeyed yellows or whites that he was breeding to the Royal Blues to try to lighten their wing colour. According to Richard Peir, he was present when grandfather Harold Peir received a box of these very yellow budgies from the visiting Chinese captain of a Burns Philp ship that came from Asia, probably Japan. Richard said that the Chinese ship's captain and Harold became good friends and had many visits together. These imported budgies apparently carried a recessive modifier gene for clearer-looking wing colour. This modifier gene drastically reduces the area of grey on a greywing's wings – it almost looks like spangle EXCEPT that it doesn't produce the white rump or halo throat spots that spangle does. And it appears to have no effect on normals, unlike Spangle.

It turns the mostly grey wing into a mostly white (or yellow) wing with thin grey curved lines on each wing covert feather. The wild-type mostly grey wings I have called type 1 (see diagram) and these mostly white wings with the thin crescent grey markings I have called type 2 wings (see diagram).



Drawing of wing covert feathers showing Type 1 and type 2 wing patterns.

It is the recessive type 2 wing mutation that underpins THE REALLY CLEAR WINGS. Only the type 2 wing mutation can produce (with help) the PERFECTLY CLEAR wings. Even if you do get fairly clear wing colour with the type 1 wing pattern, the flight feathers almost always seem to remain grey. The type 2 mutation is fundamental to both Clearwings and Blackeyed Yellows and Whites. Blackeyed Yellows and Whites are exquisitely clear coloured dilutes developed in Australia by Harold Peir and perfected by Harley Yardley: the best ones are pure yellow or pure white. To the best of my knowledge these birds, which appear to have come originally from Japan around 1930 (see above), today are unique to Australia. When I have experimented with the type 1 wing pattern I found that even if you manage to get the wings fairly clear, they tend to throw back to dirty greyish wing colour all the time. So Type 1 is a very genetically unstable mutation which seems to produce poor wing colour when crossed with the type 2 pattern. That is, it is almost certainly a gene modifier AKA a hereditary gene volume control. The type 2 modifier appears to be absent from all countries apart from Australia.



Photos of two siblings – the cock is Clearwing wing type 2 and the hen is type 1. Notice that the colour of the wing markings in both is the same, but the AREA of grey in the cock's markings (type 2) is far smaller, making the wing seem much lighter in colour. Both are violet-sky English Yellowfaced Clearwings.

After talking with Richard Peir and realising that the early clearwings got their really clear wing colour from previously unknown crosses to the earliest exhibition yellows, I found the following quote on page 46 of Neville Cayley's 'Budgerigars in Bush and Aviary'. It relates to the fact that clearwings were then totally confined to Australia and that the English breeders had failed to develop clearwings themselves. Cayley is amazed that they hadn't used some of the really clear winged exhibition yellows to create their own UK clearwings, and even quotes the English budgerigar expert Cyril Rogers to support his case. Cayley writes:

*"...it is difficult to realize how the English breeders failed to appreciate the possibilities of such productions [ie of clearwings] when they really had the stock birds evolved to do it. Cyril Rogers, in his book, 'Budgerigars', makes this reference to Dark Yellows: "These are really stock birds and are not much use for exhibition as they carry a very heavy suffusion of dark green colour which is quite opposite to what is wanted in good Yellows. Many of them are quite pretty birds, especially when they have a good depth of body colour and fairly clear wings. They were known at one time as 'Gold-wings' ". [Cayley goes on to say]....I know of only one stock bird better than the one referred to by Cyril Rogers and that is the very heavily suffused Olive Yellow, produced from the mating Olive/Yellow X Mauve White. **This bird dominates the production of [Australian] Yellow-wing Green and indirectly the White-wing Blue.**"*

Like the true Australian Clearwings, Blackeyed Yellows and Whites are also man-made varieties, not the simple result of one mutation. In the 1930s, really smart breeders cobbled a series of subtle modifiers together to turn dilutes into clear yellows and whites.

We used to call these Modifier Genes, but the vast majority of them aren't genes at all – they are gene regulatory mechanisms (more or less gene volume controls) that make up most of the DNA in all animals. Probably all genes have volume control mechanisms that control the genes' actions. These are what mostly drive both evolution and domestication. These are what we use to create Show Champions too. And they cause blending inheritance – big mated to little tends to produce middle-sized.

Genes are things that produce gross effects on any organism. These modifier elements (tandem repeats, microsatellites etc) subtly alter the effects of the genes but there are usually many of them for each gene, so subtle changes can rapidly be turned into major changes in appearance by simple selection (in this case) for ever clearer wings. They facilitate movement towards the TOTALLY CLEAR wing colour. These mechanisms are by design rather unstable and mutate about 100,000 times faster than the genes themselves. **They are both FAST MOVING and VERY FLEXIBLE.** For the most part, the clearer wing modifiers appear to be absent from countries outside Australia.



A nest full of 5 violets and 1 cobalt Heritage Clearwings – all totally clear.

2. The Results of my Matings.

I crossed spectacularly coloured Clearwings to normals and produced normals supposedly split for Clearwing. When I crossed two splits together, they produced 25% GREYWINGS most with very intense body colour (plus some with pale body colour) and 75% visual normals. This immediately appears to disprove Taylor & Warner's clearwing genetics (in the book 'Genetics for Budgerigar Breeders'). According to them, this mating could only produce visual Clearwings and normals.

When I mated spectacularly coloured Clearwings to Dilutes, I got 100% greywings with very dark body colour. Again this appears to prove Taylor & Warner wrong. It should have produced 100% Clearwings. When I mated these intense body coloured greywings split for dilute to each other, I got a small percentage of greywings with very pale body colour. Again this seems to be proof that Taylor & Warner got it wrong.*

So Where To From Here?

Well the answer is not too difficult to understand. There is no clearwing mutation – it is a modified Greywing. On top of the original greywings, a (dominant) modifier gene darkened the body colour and a (recessive) modifier gene (type 2) washed out most of the wing colour. This brought us about 75% of the way to a perfect Clearwing. Modifier elements did the rest. That is, smart breeders selected for ever-clearer wing colour and ever-darker body colour. Fortunately the gene that darkens body colour has little or no effect on wing colour and the gene that lightens wing colour has little or no effect on body colour.

Hence the development of perfect Clearwing colour in Australia within about 10-15 years of developing the first prototype Clearwings. The imagination of perhaps only 2 people (Harold Peir & Harley Yardley) created and perfected the most beautiful Elite Exhibition Budgerigar colour ever produced.

CLEARWINGS ARE A CREATION OF THE HUMAN MIND – NOT A SIMPLE MUTATION.

*Taylor & Warner's book 'Genetics for budgerigar Breeders' is overall an excellent book that has stood the test of time very well indeed. But there have been many genetic discoveries since 1961, its date of first publishing, that affect their theories. Their greatest problems with Clearwing genetics seem to relate to the fact that there were very few to zero true Australian clearwings to experiment with in the UK or in Europe in general. While I contend that Taylor & Warner got the genetics of clearwings wrong, their predicted results when you cross UK "Clearwings" to UK Greywings, are superficially identical to mine. According to my theory, UK clearwings are the original greywings with two copies of the dominant intense body colour modifier gene. When you mate them to plain UK Greywings, you should get 100% greywings with intense body colour, which is exactly what Taylor & Warner predicted. A similar effect happens when you cross UK Clearwings to Dilutes. UK Clearwings may have a very few modifier elements for slightly clearer wing colour, but I suspect that there are very few or none that have the Type 2 wing colour modifier genes. Without the Type 2 recessive modifier gene, I contend that really stable, clear wing colour is probably impossible.

While I am now 100% certain that all true clearwings are greywings, there is a possibility that there are two different types of greywing mutations, but I doubt it. I have not conducted research into this because the results will not help my fellow breeders to breed better Clearwings. Equally, for reasons of caution, I have never allowed birds classified as greywings onto my property to avoid contamination of any of my experimental results or of my birds.

Further proof that Taylor & Warner got this group wrong comes from Alistair Home a leading budgie breeder and an Australian national judge who is also a trained scientist. Alistair is a leading breeder of Greywings and in relation to the full body coloured Greywings, he wrote in an article on Greywings:

"The evidence does not support the theory that dark Greywings are the product of the combination of Greywing and Clearwing. If these darker birds are such a combination the result of mating two dark Greywings together should be to produce offspring in the ratio 1:2:1 light Greywing : dark Greywing : Clearwing. In fact, mated together they do not produce any Clearwings among their progeny. They may produce examples of the two forms of greywing (see photo below), but I know of no cases where a clearwing has been produced from such a mating."



Photo of ANBC auction cobalt Greywings to show possible 2nd?? type of greywing. It is perhaps more likely that they are greywings with an unidentified wing marking intensifier. If so, this makes the greywing the most fundamentally alterable of all budgie mutations.

BOX #1

How does an ordinary Punter breed really superbly coloured clearwings?

This is actually quite achievable as long as you are only focussed on colour:

Step # 1 – Acquire some of THE VERY BEST-COLOURED AVAILABLE CLEARWINGS. In particular, seek out the type 2 wing pattern birds . These are the ones with the mostly white or yellow coloured wing feathers with thin crescent-shaped faint grey markings on them. It is also essential to seek out Clearwings with the intense body colour (these may or may not have deeply-coloured cheek patches). It is not essential for all stock to have BOTH type 2 wing pattern AND the intense body colour.

Step # 2 – Write down how each modifier gene works:

The desirable type 2 wing pattern modifier gene is recessive to the type 1 wild-type modifier gene that is carried by most budgies. So, birds showing the mostly grey type 1 wing pattern will be split for the desirable type 2 gene if either of their parents visibly has this type 2 pattern. The intense body colour modifier gene is dominant to the paler body colour found in Clearwings. So no Clearwing can be split for deeper body colour – what you see you get. (For the curious, the intense body colour gene appears to have no effect on the intensity of body colour in normal budgies – it only affects Clearwings, Greywings and probably Dilutes).

Step # 3 – Simply select for ever-clearer wing colour and ever-darker body colour and try to avoid Clearwings with grey flight feathers.



Photo of violet clearwings, dad & mum: dad has the desirable type 2 wing pattern, mum has type 1 (but is split for type 2). Note that mum is also a visual "Greywing" but she was bred from totally pure Clearwings.



Photo of sibling violet clearwing babies from pairing in photo above showing segregation into type 1 (on the right) & type 2 wing patterns.

THE REMAINING PROBLEM

There is a huge unmentioned problem here. Maintaining the exquisite colour of Heritage Clearwings requires 100% focus on colour. But, in modern exhibition budgie breeding we are all forced to constantly outcross our show birds to catch up with the ever-changing standards of perfection. We need ever bigger heads, ever-longer masks, more and more directional feather etc, so every few years you need to outcross to really good normals yet again.

Outcrossing Clearwings is very problematic since so many genes and modifier agents are involved. Every time that you outcross Clearwings to "improve" their general exhibition qualities, you all but destroy their colour. If you do manage to improve the head size, length of mask etc while re-establishing moderately good colour, by then it will be time to outcross the clearwings yet again to try to catch up with the standard of perfection that has moved on even further. This will do even more damage to their colour. There are also monumental problems with the production of semi-modernised Clearwings having dreadfully long flights and tail feathers. These are very difficult problems to fix.



A young English Yellowfaced cobalt Heritage Clearwing. This is a very beautiful budgie indeed.

The solution to this is a simple lateral idea. We must create HERITAGE CLEARWING classes to preserve these precious living works of art. These Heritage Clearwing classes would have a totally different standard of perfection, perhaps permanently set around 1962 when Clearwings peaked in Australia. Smaller birds with perfect colour. These would not replace the mainstream Clearwing classes at shows – they should stay as they are. The Heritage Clearwing classes are conservation classes to preserve these beautiful birds in case we need them for future breeding. Who knows, in the years ahead the standard of perfection may move back to an emphasis on perfect colour and maybe even smaller size.

I arranged for experimental Heritage Clearwing classes to be held at a few exhibitions in Australia and so far all seems OK. We have now set up The Australian Heritage Budgerigar Association Inc. to oversee the process of preserving Clearwings and other almost extinct Australian varieties (eg Banded Pieds and Blackeyed Whites & Yellows).

WITHOUT URGENT ACTION, THE WORLD MAY SOON LOSE TRUE AUSTRALIAN HERITAGE CLEARWINGS FOREVER.

BOX # 2

Discussion

At the risk of getting involved in arguments, I nonetheless must try to sort out the mess where many birds are misidentified as Clearwings in Europe in particular. It is not uncommon to see what appear to be Dilutes with slightly darker body colour winning Clearwing and Greywing classes at shows in Europe. While these are probably not true Clearwings, they are very pretty birds, so perhaps in time there should be classes for these "Pastel Clearwings" – perhaps this class might include Cinnamon Clearwings as well. Very few European "Clearwings" would pass muster as being true to the original clearwing as exported from Australia. This is very problematic for the future of the variety. Even in Australia, True Heritage Clearwings are teetering on the edge of extinction. This is not just being pedantic about mutations either. We breed ORNAMENTAL budgerigars: all that they are bred for is to look attractive. Yet the prettiest Elite Exhibition Budgerigar variety ever developed is about to become extinct.



Future Class? These are dilutes bred from Heritage Clearwings that carry the dominant gene for darker body colour and the recessive gene (type 2) for clearer wings. On the left are two dilute sky cocks and on the right are two dilute English Yellowfaced Sky hens.



Future Class? Photo of a Cinnamon violet Clearwing – to me this is a stunningly beautiful bird, the first budgie to have genuine PINKISH tones: we are now calling them 'Amethysts' in Australia.

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