

# Emergence of Mutations



Above, Rubino Golden-mantled Rosellas/Photo by Richard Cusick. Following page, a “Golden Macaw” chick and a Violet Pied Indian Ringneck Parakeet/Photos by Mark Moore.

*By Lyrae Perry*

**C**olor mutations in birds occur in nature frequently. Many mutations born in the wild don't survive because they are easy for predators to spot, whereas more subtle mutations often survive. In some cases naturally occurring mutations are replacing the wild type, as in the wild Snow Goose. Mutations can either help or hinder a species survival—much depends on timing, location and a host of other factors that would fill volumes!

Several decades ago, it was common avicultural practice to euthanize mutation chicks as they were considered inferior. Fortunately the times have changed and aviculture now includes both wild type birds and their genetic mutations in breeding programs around the world.

It takes many years and more often decades to establish a mutation in captivity. On paper we can easily predict outcomes and potential numbers of mutations that should show up. Like the

weather, forecasts don't always match the reality. This doesn't mean our genetic forecasts are flawed, it just means mother nature has her own timing. There's also a certain amount of luck, skill and art involved in bird breeding.

Genetic forecasts are based on the theoretical 100 chicks produced. If a pair only produces 10 chicks in a year, it's going to take ten years to reach the 100-chick mark. Therefore, over that 10 year period, your original forecast should match the reality...and most of the time this works out just about right.

During the 10 years, you are likely to find the individual clutches of chicks are going to have more males than females, or vice versa. The same will be true for the appearance of mutations. In other words, some years you won't get any mutation chicks and other years all of them may be mutations. But over the 10-year haul, the percentages should work out to what's on paper for the 100 birds.

Many birds take two to five years to grow up before they are fertile and produce offspring, and a lot of bad stuff can happen



along the way. Young birds are like young kids, they tend to get into trouble, and there are losses. Add to that predators, illness and injuries. Aviculturists spend a lot of time figuring out how to avoid problems and maximize survival. It's a lot of work—usually thankless. But we love our birds and working

with them compensates us in ways that are hard to describe to those who are not in aviculture. The avicultural stakes are already high in terms of successful breeding and raising of chicks. Add in the mutation aspect, particularly a beautiful new mutation, and the stakes are multiplied many times over.

Gary and Lynn Redden have raised about 50 macaws with 14 mutation offspring surviving to stand on the perch over the last 10 years. This is an impressive number of mutation birds considering the odds and the difficulties along the way. There was no way for the Reddens to prepare for a journey of this

magnitude, and they have done very well, based on the numbers. Gary Redden didn't have any secrets to his feeding regime or husbandry that may have caused this mutation to occur. Those unfamiliar with mutations think "mad science" is involved and that it's possible to "create" a mutation from thin

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air. This conclusion couldn't be further from the truth. The golden macaw was a spontaneous mutation and a complete surprise to the Reddens. The mutation birds came from normally colored Blue and Gold parents. The potential for a genetic color mutation is always present in birds. When two birds have the same mutation gene, and it is "donated" by both parents at the same time, we get a visual mutation. And this is exactly what happened in the case of the golden macaws.

Both parents were normal or wild type colored birds. The first two golden macaw chicks were sexed and found to be males. This first piece of evidence suggests that the mutation color is the product of a recessive gene carried by both parents. Knowing the sex of the chicks and the parent visual color we have enough information to rule out the sex-linked and dominant inheritance modes. We know how these two modes pass on traits to offspring, and the golden macaws are not following the "rules" of inheritance for sex-linked or dominant mutations.

A recessive mutation color shows up only when both parents have the proper color gene to pass on to their offspring. The parents need not be visual for the mutation color to show. When both parent birds are normally colored and producing mutation offspring, we commonly say the birds are "split" for the mutation.

Since the first golden macaws were the only examples of their type known about in the world in 2000, we must conclude the parent birds were indeed both



**Blue Mutation Black-headed Caique with normal mate. Previous page, a Blue and a Yellow Mutation Dusky Conure/Photos by Jason Shane.**

"split" for the recessive yellow color. It's also highly likely that the parent birds were related. Unfortunately it's not possible without specific (and expensive) testing to find out just how closely they are related.

The Redden's macaws produced many more mutation chicks that were eventually sexed. Based on this information, we can confirm that the golden macaw is a recessive mutation. The ratio of males to females over time is close to 50-50 but the earliest clutches were heavily skewed male, and the later clutches skewed female.

As for the naming...that might be best decided with scientific feather analysis. The golden macaw name is descriptive for sure, but is this mutation a red-eyed recessive yellow or a red-eyed recessive cinnamon?

My guess is that it's a "recessive yellow." I inspected the feathers closely when I saw the birds. The head, body, tail and

wings are a very pale yellow, very much like lutino cockatiels. The chest color is nearly the same as the wild type Blue and Gold Macaws. We're not going to know for sure without specific testing.

The Reddens have raised more than 50 macaws in their mutation breeding program over the past 10 years. Gary is both line breeding and out breeding to establish his mutation and keep the breeding stock strong and healthy.

The Reddens have had to deal with various problems, from dead in shell and bad weather, to critters and injuries that have taken a toll on some of the mutation chicks. Of the 14 golden macaws alive and well today, most are too young to breed. This past breeding season marked the first year that a pair of mature golden macaws produced mutation chicks.

As a specialist in mutation breeding, I can fully appreciate the difficulties and management

issues the Reddens face everyday in their breeding program. I know the dedication and sacrifice it takes and the Reddens are to be commended for their efforts. I am grateful to have had the privilege of seeing and photographing the first two chicks and am thrilled to see that so much progress has been made to establish this gorgeous new mutation. The future for these birds looks very bright.

As of this writing, there is a breeder in Australia and another in Europe who have produced a yellow macaw mutation. It may be that the parent birds are distantly related to the Reddens' golden macaws, or just a coincidental and spontaneous appearance of the mutation in other parts of the world. It would take scientific analysis to answer our questions. These other birds may just be entirely new mutations with different inheritance modes. Time will tell!