Computerized Breeding for Color Mutations

by Robert Lyn and Trevor Wong
Avicultural Research Computer Systems, Inc.
Los Angeles, California

The Violet and Cobalt Indian Ring-necked Parakeets may be the most beautiful of their species. In 1987, the first Violet mutation was bred in California; subsequently, the owner not only bred a Cobalt but successfully repeated both colors in other offspring. To date, these are the only Violet and Cobalt Indian Ring-necked Parakeets known to be in existence. What made this aviculturist succeed where so many others have failed?

The Violet and Cobalt mutations were not accidents but the result of an expert breeding program. To be successful, breeders must learn to avoid the traditional pitfalls which abound in current breeding methodologies. A common example is the blind alley, where the desired color has been genetically bred out rather than isolated and purified. Avoiding these pitfalls is the purpose of a recently publicly announced computer system, called ROBS.

Robert's Original Bird System (ROBS) was created to optimize the chances of successfully breeding color mutations. By using computer generated breeding selections, mating pairs can be chosen to maximize the probability of success. Additionally, as significant by-products of the computer guided process, the system also saves time and money. How this very important system evolved was a fortunate blending of serendipity and synergy.

In 1959, Robert Lyn, a successful businessman for whom the system is named, was introduced to and fell in love with the world of birds. As any aviculturist can attest, ownership of exotic birds leads naturally into breeding. Applying the same enthusiasm and energy which had made him a success in business, Robert dove into the breeding game, only to be met with a dearth of information in literature and library. Enter Roger Bringas.

Roger Bringas, a psycho-biologist and aviculturist, is best known as an international broker of exotic mutation birds. If the bird is rare and for sale, Roger will find it for you. Between himself and other associate fanciers, he could supply answers to many of Robert's probing questions; and questions, there were. As most readers can probably fully appreciate, the novice breeder does not lack questions; he lacks sources for answers.

As a breeder matures, his queries progress from the simpler "What do you get when you cross a Blue Ring-necked with a normal Green split Blue?" to the more difficult ones, such as "What are the percentages and expected offspring from a male Blue White-headed Ring-necked and a female Blue split Pied?" These are the kinds of questions which breeders normally ask. However, Robert had some real brain teasers to solve.

Any serious breeder eventually wonders about matings for which theoretical expectations are unavailable; and Robert was no exception. For example, one of his head scratching questions was about the offspring from a pair of Grey Green split Blue split Yellow-headed Ring-necks. Despite the complexity, the answer is now known: 54 unique types of birds with percentages ranging from 0.78125 to 3.125.

Robert's dream was to capture the current body of available avicultural knowledge on mutations, put it on a computer and have some sophisticated set of programs manipulate the statistical and genetic algorithms to produce answers to all of his questions.

Robert was willing to back his desire with both money and effort. His persistence eventually paid off when he stumbled onto Trevor Wong, a computer consultant with a Master of Science degree, 20 years of programming experience, an in-depth knowledge of statistics and an aptitude for genetics. The team of three was born and out of this synergy came ROBS, a system which can trace multiple generations of cross breedings in minutes.

ROBS has to execute, literally, millions of computer instructions to generate a single unique offspring; but by so doing, it paves the way for the serious breeder to skirt the myriad pitfalls which lurk in the traditional shotgun approach to breeding. Without the use of a computer, traditional breeding has been empirically based, being more of an art than a science, more reliant on intuition and experience than on rigorous methodology.

Mutation birds are selected on the basis of their phenotypes (i.e. colors) and pedigree (i.e. induced genetic splits). Hopefully, repeated matings for a specific color will produce the desired color but the probability of success is generally unknown (except for some less complex matings). Undesired colors are culled out. If the color is still unattained after several generations, the desired color is assumed to have been lost.

However, the apparent loss of color may have several simple explanations. An obvious one is that the desired color is sex-linked; if this is not known, an incorrect choice of a female at a particular breeding fork could lose the trait. Another common cause is that the color may be recessive and is simply being masked by a different color; if so, with the correct choice of mates, the desired color may be only a breeding or two away.

A good example of a typical problem is the Lutino. In the Indian Ring-necked Parakeet, the color is sex-linked. But applying the sex-linked criteria in a mating approach with a Princess of Wales Parakeet would produce startling results since, in the latter, the Lutino color is recessive and not sex-linked. Now, "close" may be good in playing horse shoes, but not with breeding rare birds where being off by an inch is as bad as missing by a mile.

The previous are examples of common breeding problems. But, by their very nature, this class of problems is receptive to a computer solution. Specifically, the ROBS software can be used to project breeding patterns. The process is similar to shining a flashlight into a dark room. You can choose to illuminate all the areas of interest to you. When you take your first step into the room, you know the chosen path will eventually lead to your goal.

An old axiom is that a good start is nine-tenths of a job well done. This is never more true than with expensive

Photo courtesy of Roger Bringas

This yellow-headed mutation of the Indian Ring-necked Parakeet is too rare and valuable a bird to randomly breed "shotgun" style. The accompanying article by Lyn and Wong explains their highly sophisticated computerized system of maximizing the bird's breeding potential for producing desirable colors in offspring.

birds, where initial choices of mates may launch multi-generational breeding programs, encompassing many years. Using ROBS ensures that the genetics of the selected breeding pair *can* produce the desired offspring; of course, nothing can guarantee a specific offspring but ROBS does provide the breeder with the full scope of progeny possibilities.

No one wants to be "penny wise and pound foolish." Yet, breeders do it every day! Expensive mutation colored birds are mated and re-mated, bred and cross-bred on the basis of almost non-existent knowledge of the genetic statistical distributions. Even granted the validity of the initial matings, wouldn't it be nice at every subsequent pairing to know which choice would provide the maximum likelihood of producing the desired offspring?

Furthermore, the major financial disadvantage is not the cost associated with the failure to breed a desired color; rather, it is an opportunity loss. Since a breeding tree may involve multiple generations over several years, wrong choices not only produce wrong results but worse than that, they tie up expensive birds and prevent more fruitful pursuits. Unfortunately, if you don't know where you are going, you can't make good choices.

From this perspective, the ROBS software may be viewed as a potential boon, perhaps even a necessity, to any serious breeder. It maximizes success by providing an inexpensive method of researching mating possibilities, either as distinct pairings or as multi-generational breeding trees. Furthermore, ROBS saves time; the feasibility testing of potential mates condenses years of experimental breeding into minutes of computer time.

This feature, the compacting of the time frames needed to explore different color combinations, results in probably the best advantage of ROBS. Using the computer to experiment with different mating combinations can result in identifying a veritable bonanza of new mutant possibilities for your birds, e.g. an owner recently found out that his birds could produce a Cobalt White-headed Ringneck. Is that rare and exotic enough?

Why is ROBS so effective? Geneticists have known for years how to use Punnett squares to compute theoretical mating percentages. In fact, a number of simpler mating combinations have already been published. But until now, this approach was limited by the sheer number of calculations and permutations (one book uses 115 pages for only 8 colors of one species *without* percentages). Yet, even more importantly, the computations are very prone to error.

Errors in the statistical analysis can occur from two sources. First, the tedious nature of the mathematics creates problems. Second, the Punnet square methodology can only be as effective as its initial information. Fortunately, as everyone knows, computations are the meat and potatoes of computers and with the fortuitous "coming together" of the ROBS team, a wealth of breeding knowledge has been integrated into the program.

Currently, the body of avicultural information captured by ROBS represents all known color mutations of most major species. As new mutants occur, updating is done by a complex set of computer software programs which emulate a genetic model. Pairings are accomplished by a statistical approach which involves millions of computer manipulations. The complexity of the system is best illustrated by the following example.

To process all pairings in a simple two generational breeding tree, consisting of birds with not more than three split colors, would involve over 16 million calculations. A bit of a task for even the "fastest fingers and brains in the west." But, in this way, ROBS places the speed and accuracy of the computer at a breeder's fingertips to answer the simple but profound question, "What are the expected results of mating this cock to this hen?"

In conclusion, ROBS is a system for providing computerized breeding selections to maximize the probability of successfully breeding a desired color, usually with major savings in time and money.

At this time, multi-generational mating trees are available only to recognized avicultural clubs, zoos or universities doing avian research and no cost has been established at the present time. If you are working with color mutations and are interested in theoretical mating percentages for individual pairings, call 1 (800) 234-6286 or write to Robert Lyn c/o Avicultural Research Computer Systems, Inc. (ARCS Inc.), 4216 Beverly Blvd., Suite 252, Los Angeles, California 90004. ●

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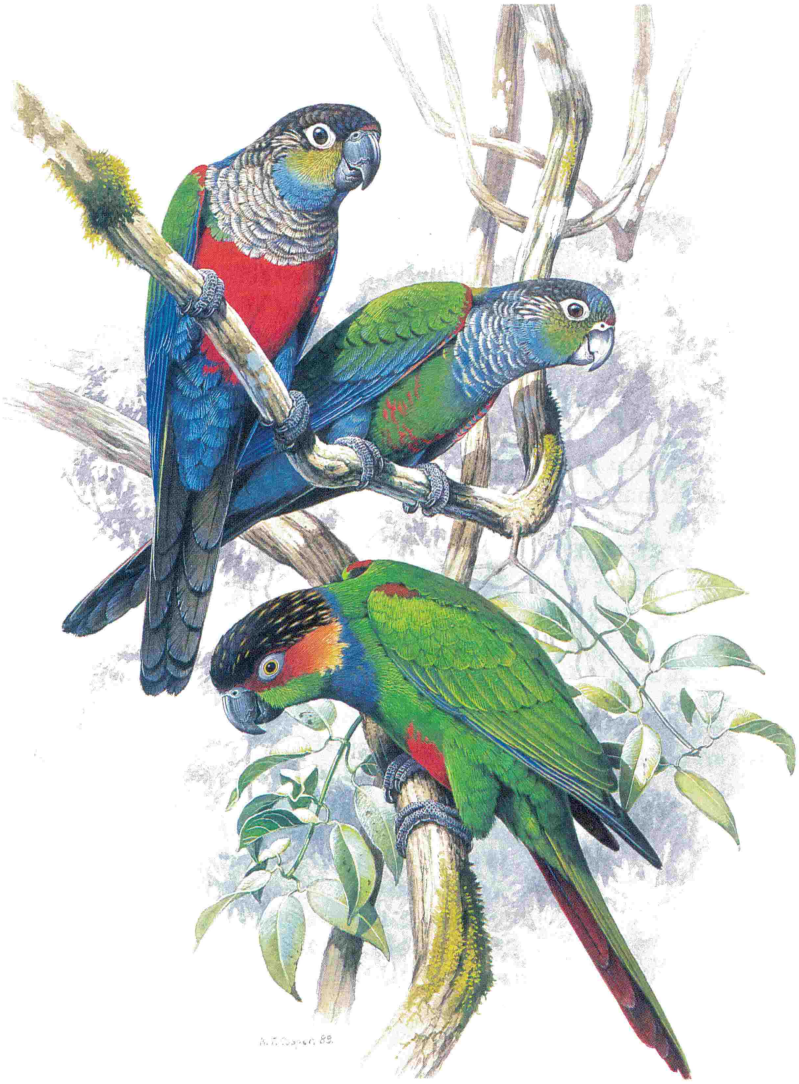

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