

# Breeding Red-breasted Toucans

## History on the Reproduction of Wild-caught and F1 Generation Toucans

(*Ramphastos dicolorus*)

by Luke Thirkhill  
Phoenix, Arizona

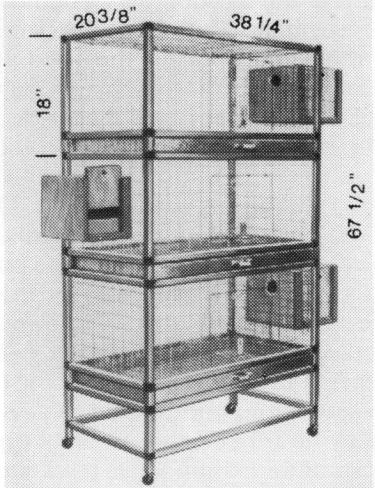
Phoenix is famous for its mild winters, hot summers and usually brief fall and spring transitions. Despite the inconvenience of hot summers, the typically mild winters enable the Phoenix Zoo to maintain its entire bird collection outdoors year around. Our waterfowl, crane, ratite, raptor and gamebird species are not as adversely affected by our weather as the hookbill and softbill species. With the exception of Gouldian finches (kept in the past), none of the various bird species are provided with a heat element in the winter. However, every bird exhibit that houses either softbills or hookbills, both on and off display, is equipped with a water mister that sprays a fine cooling mist whenever the air temperature exceeds 100° Fahrenheit. The misters are located in the exhibit in such a way as to give the birds the option of perching away from the water spray should they prefer to remain dry. Amazing as it may seem, many birds do not take advantage of the water spray even when temperatures exceed 112°; they simply pant it out and move around as little as possible in the heat of the day.

A few weeks out of the year in the dead of winter these same birds are exposed to nighttime temperatures at freezing or slightly below. There are only a small handful of localities in the country where exotic hookbill and softbill species living outdoors year around could experience this sort of extreme. It is often a mystery to me how birds from tropical climates can acclimate to our seasonal extremes that vary from 118° in the summer to 28° in the winter. The red-breasted toucan (*Ramphastos dicolorus*) is such a bird and is one of three toucan species maintained at the Phoenix Zoo. Our young pair of keel-billed toucans (*Ramphastos sulfuratus*) were only recently acquired and our adult female toco toucans (*Ramphastos toco*) have been awaiting mates for over two years. However, at the time of this writing, a toco likely to be a male was recently donated and a second male in another state, I am told, has been located.

Our first red-breasted toucan, a wild-caught adult male, arrived at the Phoenix Zoo in December 1978. He was donated by a local patron. This bird was kept on display alone while the search began for a mate, finally ending in three years, when Bernard Roer, a prominent aviculturist in the Phoenix area for more than forty years, was able to locate another red-breasted toucan through his many contacts in the field. The bird was acquired and housed for one month at the zoo's quarantine facility which is standard. In the time that the bird spent in quarantine it was happily presumed to be a female, as there was an obvious size difference in the beak of this bird compared with that of the male. His was longer. (It has been my experience that at the time red-breasted toucans fledge, between five and six weeks of age, there is even then a slight difference between beak size in siblings that would suggest which were males and which females. Their beaks, of course, continue to grow for several months after fledging and their beak sizes are even more obvious to suggest male from female.)

Shortly after the new toucan left our quarantine facility it was surgically sexed and confirmed to be a female. It was also revealed to be a mature adult when the bird's ovaries were examined. These red-breasted toucans were first introduced in adjacent small flights in early March of 1981. This allowed them to become familiar with each other without having the possibility of injury should there have been aggression at the initial introduction. The male took notice of the female immediately and began to vocalize to her. At first, she paid little attention to him. The birds were kept in this situation for nearly two weeks.

On March 15, 1981, the pair were both moved and placed together in a different aviary. This exhibit, measuring twenty feet long, eight feet wide and nine feet tall, has a small, shallow pond at one end and several natural branches located throughout the aviary. A five-foot tall, partially hollowed, date palm log, with a small entrance hole cut near



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the top and a round plywood lid, was placed on the ground in the back corner of the aviary opposite the pond. If the heavy log was placed on a pedestal to make the entrance hole higher than six feet from the ground, it would have been too difficult to monitor the nest cavity during any nesting activity. Most of our bird exhibits at the Phoenix Zoo have guard rails that keep the public three to four feet away from the front of the aviaries. This discourages public feeding, aggressive birds biting patrons' fingers and affords the birds some flight distance from undesirable zoo visitors that find it necessary to bang on the front of an exhibit so as to excite the birds or make them fly about. The red-breasted toucan aviary is one of five aviaries of similar dimensions, all incorporated under a large, tall palm frond-thatched structure. The group of aviaries is known as the "Tropical Bird Exhibit." In the center of the complex there is a series of adjoining benches that surround a stand of giant bamboo which grows through the opening provided at the center of the thatched roof. The idea is to encourage people to sit down and relax while giving them the opportunity to observe bird behavior in different species. All too often the average zoo patron merely glances at the aviary's occupants, reads the name on the graphics panel and goes on to the next exhibit. A talking parrot might spark their interest for several minutes.

Due to the aesthetic nature of the tropical bird exhibit, guard rails were not incorporated into the front of the five flights and the public is able to stand up against the front of the aviaries. This did not seem to affect the red-breasted toucans. The male had first been introduced to the aviary in October of 1980 when he was displayed in solitude, so he was somewhat familiar with the exhibit. The initial introduction of March 15, 1981 for the pair was unsuccessful. The male chased the female around the aviary aggressively, so the pair was separated and reintroduced on March 24, 1981. This time all went well. The male immediately took notice of the palm log in the corner of the exhibit and proceeded to inspect it. Later that day he began to court the female and two days later the birds were seen preening each other. The pair-bond was forming quickly and the birds seemed quite compatible. On May 1, 1981 a breeding was seen by our zoo's director, Dr. James Savoy, as he was passing by the aviary. The copulation of the red-breasted toucan is not elaborate and the

entire episode is quite brief, so it was just by chance that Dr. Savoy happened to be passing by at the right moment. At the end of that first week in May 1981, the female toucan first began entering the palm log. On May 10th, three eggs were confirmed to be down in the cavity. Incubation began at this time and was carried out by both the male and female. This first clutch, however, was mostly incubated by the female. The incubation period for toucan eggs in general, compared to other birds, is quite short, usually sixteen to nineteen days. On May 26, 1981, two of the three eggs hatched. The next day the third egg hatched. All seemed well at first, as both parents actively were involved in feeding the new chicks.

At the Phoenix Zoo, our toucans are provided with free choice, small dry dog kibble and a crock of fruit and vegetables first thing in the morning. The diet is cut into one-half inch squares and includes apple, tomato, cucumber, zucchini, banana, peas, grapes or soaked raisins and, when seasonably available, blueberries, strawberries, peaches and melon. Also included in this fruit crock are a few small pieces of our "Bird of Prey" diet rolled up into balls. At the Phoenix Zoo we prepare our own "B.O.P." (Bird of Prey) diet by using a base of commercially-prepared feline diet and to this we mix whole, frozen, thawed pigeons, chickens, rabbits and rodents that have been ground up in a meat grinder. This is an unpleasant but highly nutritious diet for birds of prey and omnivorous softbills.

When the three new chicks hatched the diet was increased to the parents; they received their early morning crock and an additional ration at the end of the keeper's work day. In addition, their dog kibble was also available in a moistened form and myna bird pellets and pinky mice (one to four-days old) were also made available. The new parents fed the chicks for two weeks before problems arose. On two consecutive days they threw two of the chicks out of the palm log. Fortunately, the five-foot drop to the ground did not injure them too much. It was decided that these two chicks would be hand-raised. The third chick had better body weight than its siblings and was left with the parents. They continued to feed this chick for another two weeks and at four weeks of age the chick was found dead in the nest cavity. The cause of death was uncertain. There were no external sounds and the temperature at the time was not that bad, so heat stress was ruled out.

This first clutch had its problems but they were welcome, for apparently this was a first breeding for this species in North America. None other had been recorded or known. This was also the beginning of a success story, for this pair has gone on to produce 33 young from May 1981 to present. Of the 33 chicks that hatched, 8 did not survive for one reason or another, so the actual number that have fledged and matured is 25. This pair has been observed through the years to double and even triple clutch in a season by themselves without the pulling of eggs.

The year 1983 remains the record season with four chicks in April, three in June and three in July. In later years we have had to discourage double or triple clutches if they occurred in July and August, for our summer temperatures commonly exceed 110°. This, needless to say, is just too hot for eggs to be incubated or chicks to be raised in a palm log with poor ventilation. This pair produces most of its clutches in April, May and June when the usual daily high temperature ranges between 85 and 105 degrees. The past two Junes, however, brought unseasonably high temperatures for a few weeks that exceeded 110°. The fact that the pair has used and excavated this palm log for five years has made the inner cavity quite difficult to inspect for the well-being of eggs or chicks. Each year the cavity has become deeper.

This spring the palm log was removed prior to the breeding season, and in its place the option of a smaller scale palm log section and a plywood nest box were given. To our satisfaction, the nest box, measuring three feet long, twelve inches square, was chosen. A four-inch diameter entrance hole was decided upon and, in addition, a square piece of palm log with a depression carved into it was fitted into the bottom of the box so that the female could incubate her eggs in the substrate she was accustomed to and so the young toucans would have a medium to grip so that their legs would not splay outward. The other option, not chosen, the small-scale palm log, was fastened to a rack and hung from the aviary wire about 4½ feet from the ground. It measured 22 inches long and 20 inches around with an inner cavity that was ten inches deep and nine inches around.

The toucan pair raised and fledged two chicks this breeding season at the end of May and, as of yet, have not double-clutched.

The second part of this paper deals

*Continued on page 22*



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*Continued from page 20*

with the formation of our captive-born pair of red-breasted toucans and their recent successful hatching and raising of the Phoenix Zoo's first second-generation red-breasted toucans.

We kept one of the two original 1981 chicks that we hand-raised so as to later pair it, ideally, with another captive-born bird and create an f1 generation pair. It was uncertain at the time where we would find an unrelated domestic-raised bird. However, we were certain we did want another pair of red-breasted toucans as a backup pair, should we have encountered health or reproduction problems with the wild-caught pair.

Fortunately, we did not have to look very far or long for another unrelated bird. In 1982 we learned of a private aviculturist in the Phoenix area who had a successful hatching and parent raising of a few red-breasted toucans in June of that year. He was as happy to receive an unrelated captive bird in trade as we were, so he too could create an f1 generation pair of birds. Our wild-caught toucan pair hatched four chicks in April of 1982. Three, unfortunately, did not survive, but the remaining chick developed, fledged, and grew normally. It was this bird that was traded for the private aviculturist's domestic toucan. We acquired his bird in November of 1982 when it was five months of age and quite independent of its parents. After the bird left our quarantine it was surgically sexed in February and found to be a female as its beak size indicated.

Up until this time our hand-raised male from May 1981 lived alone in his flight, measuring 12 feet long, six feet wide and nine feet tall, at our off-exhibit breeding and housing facility which includes a series of thirteen flights in one area and five in another. When the f1 birds were first introduced to each other, they had similar problems of aggression that the wild birds did when they were first introduced. At this time it is important to point out that the hand-raised male was no longer "tame" or friendly. When his mate had been in the flight for just a few weeks he started to show aggression to me, his keeper. When I entered the aviary to perform routine cleaning and feeding duties, I was greeted with loud threatening vocalization and angry vertical head bobbing. This was to get worse as the years passed, to the point where he would fly to and attack my face if given the opportunity. I learned in time to keep my head low and eyes to the ground. Eye contact with this bird was

interpreted as non-submissive in his territory. To this day, after five years, he will still attack if I don't keep my eyes low and service the aviary quickly. The female, being parent-raised, is usually calm but still has her instinctual fear and mistrust for a human being.

Nesting behavior in our captive-born pair first became apparent in March 1984 after having been together for a few months over a year. At this time the female was one year, nine months of age and the male two years, ten months of age. At the end of March 1984, I noticed a broken egg on the floor of the aviary and discovered another in the nest cavity. She did not incubate this egg but it was our first indication that she was sexually mature. Prior to this event, the maturity of this species may not have been known but perhaps presumed to be close to that of similar species. Our wild-caught pair were both acquired as adults and their ages are unknown.

The rest of 1984 proved to be uneventful for this pair. The nest log provided to them is not a palm log section but a natural hollow piece of cottonwood found on the zoo grounds. It measures 26 inches long, 13 inches around and has an inner cavity that is 18 inches deep and six inches around. The log has round plywood pieces adhered to the top and bottom and is hanging at the top rear end of the aviary with the entrance hole about eight feet from the ground.

In April of 1985 the f1 female produced a clutch of three eggs and carried out most of the incubation by herself. The male would briefly incubate the clutch when she left the log to eat or drink. In a normal compatible pair of birds it is customary for the male to feed the female during courtship and egg incubation. However, as this pair seemed to be incompatible in their history together, he did not offer her food during incubation. Nor do I recall his showing any real signs of courting. He was just a little more than tolerant of her presence. After the incubation period had passed, the clutch of eggs were checked and found to be infertile. The female went on to lay a second clutch of two eggs in the middle of May. The male shared in more of the incubation in this clutch than during that of the previous one. At the end of May when the eggs were past due, they were again checked. One egg was missing and the other had a fully developed dead chick that apparently had died during the pipping stage of the egg. Quite a disappointment!

When servicing the aviary that May

of 1985, the male toucan began his most aggressive assaults to date. He would fly repeatedly through the air, his long beak like a torpedo, right at my face before I would catch him in mid-air and gently drop him to the ground. Looking back, his persistent aggression and seeming hatred toward me was rather humorous. I eventually had to enter the aviary wearing a plastic hard hat with a net in hand to keep him at bay. The presence of a net unfortunately made the female quite upset. This was around the time I first saw displaced aggression from the male to the female. He would not fly to me and attack when I had a net in my hand, so in his rage he chased the female when I left the pen and took it out on her. This had me as distressed as she was, I'm sure. How could one expect to breed toucans with an incompatible pair of birds? The problems of imprinting were evident, however, when the 1985 breeding season came to a close, his displaced aggression became less and less.

This brings us to the 1986 season, one that I shall always fondly remember. Second-generation toucans became a reality. That spring our f1 female was confirmed to have four eggs in the nest log in the second week of March. On the 16th of March she began to incubate them. The male again shared in the incubation and on the morning of April 1st I saw him leave the nest with an egg shell in his beak. The first chick had hatched. The next day a second chick hatched. The remaining two eggs never did hatch and later, when they were removed, they were found to contain dead embryos.

The "Odd Couple," as I thought this pair should be called, were good parents. In fact, too good! They fought over who would feed the chicks! For the first week and one-half, I observed the feeding behavior of this pair for one hour after the initial introduction of the early morning feeding. I wanted to be sure they were feeding the chicks adequately and to learn of their food item preferences and choices. As mentioned earlier in this paper, the fruit crocks were provided twice a day when parent birds are rearing young so that there is an ample supply and to ensure the food quality as the heat often spoils the fruit. This spring the produce items available at the time were apples, tomatoes, bananas, grapes and peas. In addition, hard-boiled egg, dog kibble, infant mice and B.O.P. diet were also available.

Both the male and female had different first-choice items that they would feed the chicks, and these items

remained constant during my observations. The male would choose peas first, gather a few in his bill, crush them a little and then fly to the nest to feed them. The female chose sliced purple grapes first and would frequently fly to the entrance of the log and harshly vocalize at the male to "get out" so she could enter and feed grapes.

After most of the peas and grapes were fed, their second choice items became apparent and these, too, also remained consistent. The female chose the one-inch in diameter "bird of prey" meat balls and the male chose the freshly-thawed pinky mice. When the male would feed pinkies and the female grapes, I first began to notice the tearing behavior that involved the use of their feet to hold on to the food item as they ripped tiny pieces from it to later feed to the chicks. As the chicks do grow rapidly, this behavior diminishes and the parents simply crush the food items a little before feeding it to them, for the babies are soon able to handle food morsels of equal size to that which the adults are accustomed. Food items that were seemingly never fed to the chicks were the same items that they did not include in their own diets. These items were cucumber, zucchini, banana and hard-boiled egg yolk and white.

The one inch by two inch welded wire makeup of the f1 pair's aviary affords English sparrows the opportunity to squeeze through the wire and steal toucan fruit and dog chow. Quite often throughout the year the sparrows themselves become food for the toucans. They capture, kill and consume all but the wings, usually. In the span of time that the f1 toucans were raising their f2 chicks, they captured, killed and fed three sparrows to their chicks that I know of. There is always some concern for the transmission of avian diseases and parasites from these sparrows, but the presence of sparrows is a problem nearly every zoo and private aviculturist in the country faces at one time or another. Our toco toucans also actively capture, kill and consume sparrows as well; however, through the years I have also found the remains of larger native birds such as cactus wrens, thrashers, Inca doves and young Gambel's quail.

On May 10th at just over five weeks of age, one of the f2 toucan chicks was seen peering out of the entrance of the nest log. On May 11th, on my first check in the morning, both chicks had fledged. At first, their flying ability was poor and their balance on a perch, shaky. On May 12th and 13th, the chicks entered back into the log and

later left it again. The two chicks gained their agility and balance in a week's time. The parents, still quarrelsome amongst themselves, showed no aggression to the juveniles and continued to feed them. By May 25th, two weeks after fledging, they were feeding themselves from the fruit crock and dog kibble cup. Also around this time, their vocalization, which at first was low and plaintive, became loud and agitating, like their parents. They also were showing more of the different modes of head bobbing that accompany different vocalizations to indicate fear and agitation or contentment and approval. A few days after they were seen feeding themselves, they were removed from their parents and placed in a nearby aviary out of visual range. They were probably, however, in auditory range, but I did not notice any exchange of calls between the parents and their chicks.

Now, after a few months away from their parents, the young toucans are doing well and are in complete adult plumage. Their beak sizes are similar, so I presume they are the same sex; however, they quarrel from time to time, interlocking their beaks so as to establish which will be the dominant bird and which will remove most of the choice fruit morsels from the morning crock first.

I hope this history of the red-breasted toucan breeding program at the Phoenix Zoo will be helpful in the propagation efforts of this species in other regions, as well as applicable to other similar toucan species in need of captive breeding programs. As a whole, I think the 41 species of toucans are rather poorly represented in captivity, due largely to the difficulty of collecting them from their often-remote jungle and mountain habitats.

As far as zoos are concerned, I think most will agree that this group of birds is a popular attraction. The public will support conservation efforts in this species if they are made aware of its plight. The bird has enjoyed familiarity and recognition in the public's eye for over twenty years, due mostly to the Fruit Loops brand of Kellogg's cereal and its advertising. As the forests and jungles in South and Central America are removed for "progress," so, too, are the toucans and hundreds of other bird species dependent on this diverse habitat.

In closing, when private and zoo aviculturists acquire and work with tropical bird species, perhaps they will consider the advantages of establishing unrelated f1, 2 and even 3rd-generation

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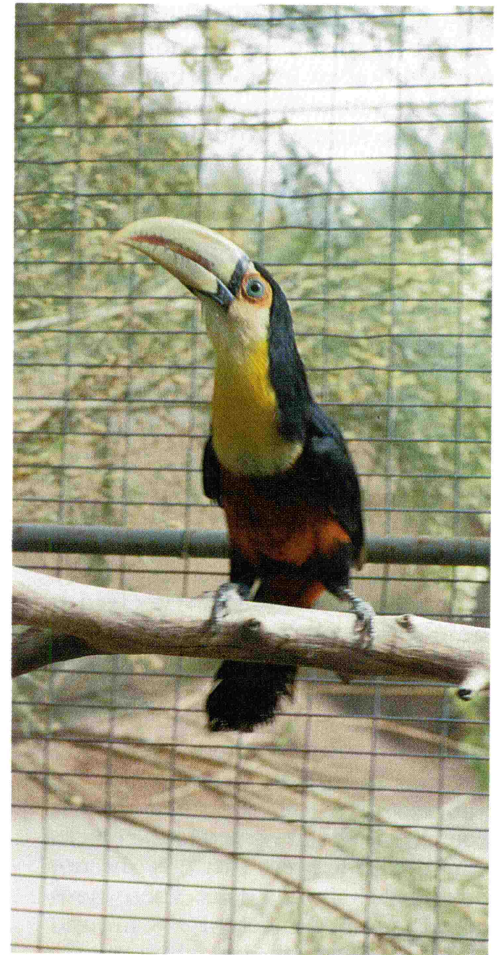
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*The original pair in their aviary, spring 1986. The male on top of palm log.*

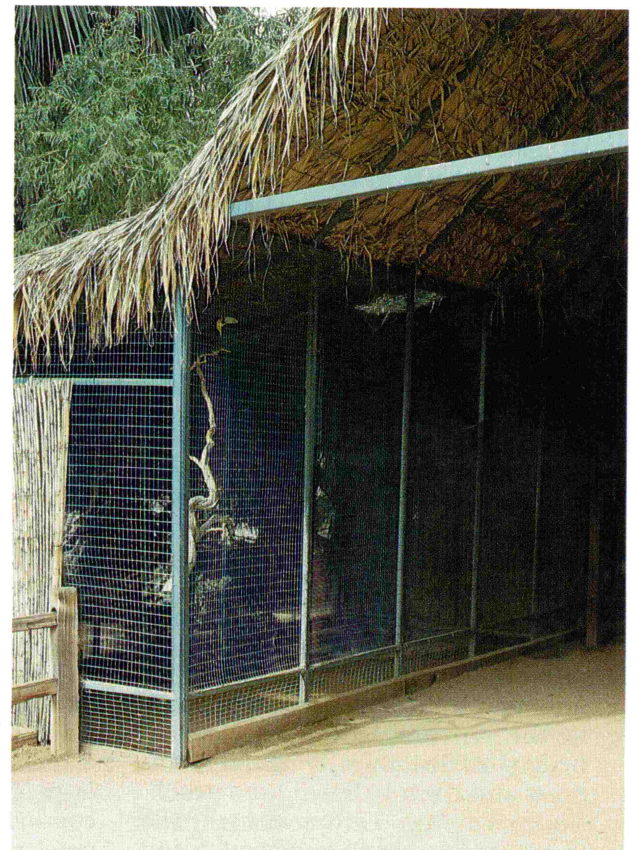


*The Phoenix Zoo's first second-generation red breasted toucan at 6 months of age.*



*The captive born pair (fl) in their off-exhibit aviary. Cottonwood nest log in background.*

pairs of the same species to make its breeding more predictable and simple. All too often, wild-caught birds or captive-bred birds with uncertain lineage are set up, bred, and, due to space or economics, their offspring are sent off with no follow-up as to their future reproduction or well-being. Let's take the maintenance of genetic relationships more seriously. As we all know, the common or available tropical birds of today will be the unavailable birds in trouble tomorrow. ●



*The original pair's aviary at the Phoenix Zoo.*



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