

Breeding the Salvadori's Fig Parrot

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Fig parrots are an interesting group of birds of which very little is known. They belong to the family *Psittacidae* and are, therefore, true parrots. "Fig parrot" is, in fact, a conventional name without scientific basis. The group includes two genera, the *Opopsitta* and the *Psittaculirostris*. The two groups are very similar in their biology and have many common features. The *Opopsitta* are smaller birds and were known in aviculture, though as a rarity, since the beginning of the century. The *Psittaculirostris* were virtually unknown until the beginning of the '70s. The information about both genera is very scant. In *Parrots of the World*,¹ Forshaw gives some basic information about their habits, but nothing about breeding. Rosemary Low has a detailed chapter in one of her books,² written with the aviculturist's point of view, and reports whatever was known in 1983. However, even that does not totally reassure the aviculturist challenged by the keeping of these species.

Among the *Psittaculirostris*, the *salvadorii* is the rarest. Its range of distribution is a limited area of the northwest part of West Irian (Indonesia), in the island of New Guinea. The other two species are distributed in the southern lowlands of the island and on the extreme western tip of West Irian (the *desmarestii* with its six subspecies), and on the northern coastal areas (the *edwardsii*). The range of these birds overlaps that of the Yellow Streaked Lory (*Chalcopsitta sintillata*) and the Yellow-capped Pygmy Parrot (*Micropsitta keiensis*) for the *desmarestii*, and the Duyvenbode's Lory (*Chalcopsitta duyvenbodei*) and Buff-faced Pygmy Parrot (*Micropsitta pusio*) for the other two species. Biologically, fig parrots are very close to the pygmies, somewhat reminiscent of lorikeets in their behavior?

I acquired my pair of *salvadorii* from an aviculturist who had tried to breed them unsuccessfully for about one year. The species is dimorphic, as are all fig parrots except for the

desmarestii, so there was no problem of sexing. However, I was told that there was uncertainty about the gender of the female at the time of acquisition because it had not as much blue as Forshaw describes¹ and it had some red in the breast. It is possible that there may be variability in coloration or that she was still a juvenile. The birds had laid eggs on three occasions, but the only time they hatched a chick, it had died after three days or so.

I was well aware of the difficulties encountered in breeding these birds, and even in keeping them alive when the species started to reach the market, so I researched as much information as possible about previous breedings of the *salvadorii* and related species. I know now that the species has been bred at least once in the U.S. by Jan Van Oosten, but at the time I acquired my pair I did not know of any breeding except the one of Weise.³ I had read with much attention the articles on the breeding of the *edwardsii* by Elsa Aglow⁴ and of the *desmarestii* by Bill Lasarzig⁵ in the *AFA Watchbird*. The articles contained interesting information. However, I could only apply some of the knowledge acquired by reading these articles because my avicultural situation presents some peculiarities, in that I live in an apartment in downtown Boston and, therefore, my birds are in my bird room under totally artificial conditions of light cycling and spectrum, humidity and temperature. Of course, this makes breeding more difficult than outdoors but has the advantage of enabling me to determine the complete requirements of a species once it breeds for me.

The first problem with the fig parrots was the diet. I had talked to many people about it, and I had received contrasting information. It seemed that the only thing everybody agreed upon was the high requirement for vitamin K and zinc in this species. In fact, I was impressed by the line of reasoning that led Elsa Aglow to discover the requirement of

zinc for her *edwardsii*, based on the similarity of the fig parrots with the pygmy parrots that eat lichen containing very large amounts of minerals.⁴ Most of the people feed fig parrots figs, lory nectar, live food such as mealworms and fruit. Although I have a mixed collection containing softbills, I rarely resort to live food. I feel we do not really understand a species if we cannot provide a balanced, artificial diet scientifically formulated that allows a species to complete all stages of its life cycle including breeding. So I discarded, at least initially, the idea of feeding mealworms. My birds also had a word about their diet, because they seemed to be very conservative in their taste. After long trials and many errors, I ended up feeding my birds regular parrot mix supplemented with buckwheat and millet, millet spray, a fresh fruit and vegetable platter every morning, containing (in order of preference of the birds) sliced banana and carrots, apple, a rice and bean mix, corn on the cob (they also love it hanging from the cage wall), dry prunes or mission figs (cut in half), green cabbage and some spongecake, cheese bread or crackers (these three items are generally ignored). The cooked bean and rice mix contains mostly beans and lentils, as many varieties as I can find. Generally, I mix green and pink lentils, chick peas, pinto beans, kidney beans, and about one third of the dry volume of the beans in rice, soak them overnight and boil them for 10 minutes, so that the mix does not become a shapeless blob but still resembles something like seeds. The food is laced with Nekton Tonic-K (Nekton USA, Inc., Clearwater, FL), 1/4 teaspoon Nekton Q (Nekton), and purified soybean protein (Bread and Circus, Brighton, MA). The Nekton Tonic-K is a food supplement and contains primarily free amino acids in a blend designed to complement the diet of seed-eating birds. The precise composition is proprietary, but the label states that it contains lysine and other amino acids that are scarce in seed protein. It also contains vitamin A, zinc and vitamin K. The Nekton Q is a pure vitamin preparation containing high amounts of vitamin K, A and (note!) no calcium. It is designed for birds during quarantine (thence Q) when birds are under antibiotic therapy. Calcium is omitted because it interferes with the absorption of tetracyc-

line used to treat quarantined birds. The birds have also fresh water every day and they drink and bathe in it, and a hanging cuttlebone that they devour when they are ready to lay eggs. I felt that the protein was necessary, at least when the birds were raising chicks, although I do not have scientific proof of it.

Psittaculirostris salvadorii are very beautiful, active, little parrots with shiny feathers, who like to bathe and chew a lot. Their droppings are more liquid than those of regular parrots such as the Amazons, and have very little white urate deposits, possibly because of the high amounts of liquid in their diet. However, they are perfectly manageable in a domestic environment. They tend to be messy with food, with a little splattering of the banana. Cleaning the perches every three or four days is imperative. They have several calls, all nice, melodious warblings, and one high-pitched, shrill call when they are disturbed. They also have a peculiar, vibrating, low-pitched sound that they emit when copulating.

My birds live in a cage 36" in length, 24" in depth and 22" in height, made of welded wire 1/2 by 1 inch. My birdroom is a rather small enclosure without windows. It communicates with my living room with a large door opening, which is covered with a black, heavy curtain and gauze. In the same room are housed a pair of African Grey Parrots, a pair of Double Yellow-headed Amazons, two pairs of Fischer's Lovebirds, two Sparkling Violet-eared Hummingbirds, two male Yellow-legged Honeycreepers and a pair of Gouldian Finches with their three pairs of Zebra foster parenting pairs. The lights (fluorescent Vita-Lights) are timed to go on at 6:30 a.m. and go off at 8:00 p.m. There are two periods of twilight of 30 minutes morning and evening to allow for the hummingbirds and honeycreepers to find their roosting places for the night (generally the chandelier). The hummingbirds and the honeycreepers are kept free-flying. Temperature oscillates between 68 and 75°F. Humidity levels vary between 60 and 75%.

The nest box is a hollow log that I was fortunate enough to find, measuring about three feet in length, with an internal cavity of six to six and a half inches in diameter. It is placed slanting at 45° and the entrance is a crack of three to three

and a half inches on the top. The cage roof is half covered. The birds like this cover and spend most of their time under it when they are not in the nest, because it gives them a sense of security, I believe. Also, the hummingbirds that I keep free flying in the room cannot scare the fig parrots by landing on the roof of the cage.

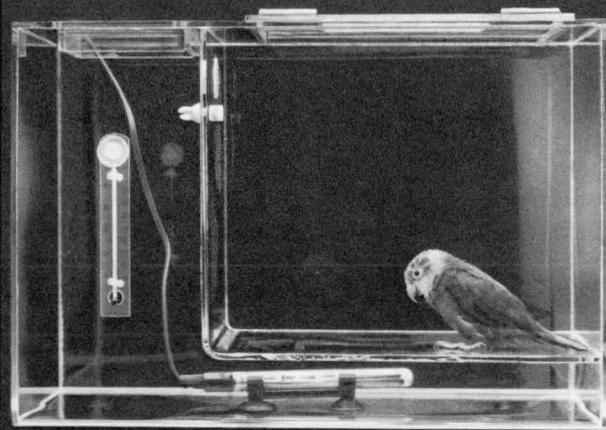
The nest box has a door carved in it for the daily inspection, and is filled with about two inches of orchid quality firbark, the variety that comes in large pieces about one to one and a half inches (Tropical Plant Florida Products, Inc., Orlando, FL). I also add some rotting or soft wood for them to chew. The hen chews a lot both when sitting and when not breeding. Overgrown beak has been reported as a very common occurrence in this species² and, in fact, my male had a half-inch too much beak when I acquired it. However, I found that the beak does not need to be trimmed. If the birds have chewing material, the beak gets back to proper size in a few days, and the risk of bleeding from trimming is eliminated, especially when the birds are initially acquired, when bleeding risk

is highest. A ladder of welded wire is nailed inside the nest for the birds to climb, but I had problems with it and I do not think it is necessary. Perhaps glued pieces of wood as recommended by Bill Lasarzig⁵ could work better and be safer. I had a problem once with a chick that got its leg band caught under the wire. It injured itself and was bleeding a little. It was stuck in there for hours during an attempt to climb out of the nest. Fortunately, I finally checked because it was crying a lot. These chicks really cry a lot, but this was too much, so I looked inside and I saved it. It healed in a few days without consequences.

My birds came in on June 4, 1990 by airplane from Tennessee. I had them examined by my avian veterinarian, Dr. Alexandra Kilgore, who recommended fecal examination for parasites, a gram-stain, a culture to detect possible gram-negative bacteria, blood cytology and biochemical profile. It may be of interest to have these data for future reference, so I give them in Table 1. The birds were judged in very good health, but they had a double infection with gram-negative bacteria, which were identi-

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The Salvadori's Fig Parrot is sexually dimorphic as an adult. The male has a red bar across the breast and the female has much more blue on the head.

fied as *E. coli* and *Klebsiella oxytoca* and were sensitive to a variety of antibiotics. With Dr. Kilgore, we decided to treat the birds with chloramphenicol in the food for a week, then culture them again. The culture came back negative, so on June 19 I decided to introduce the nest box. The birds used it immediately, and from that night they always slept in there.

Their first clutch (see Table 2 for information on eggs and incubation) was two eggs laid on July 3 and 5, which the female incubated tightly. They were candled every three days, and their growth was normal. The eggs were rather soiled, but no attempt to clean them was made. One chick hatched after 23 days. It was covered in yellow-white down and was left with the parents. After three days, it died. Both the unhatched egg and the chick were sent for autopsy and pathology, but nothing relevant was found. The chick had food in the crop and gram-negative bacteria in the gut.

I started to analyze the possible causes of this failure, and I talked again with a lot of people. Most of the people who had chicks from the *salvadorii* had lost them anytime between birth and four weeks of age, both if they had hand-fed them or if they had left them with the parents. Many people had also lost the hen by haemorrhagia including Wise.³ Together with my veterinarian, we tried to use our knowledge of human and animal diseases combined to find

a solution to this puzzle. It was not diet, as documented by the excellent blood chemistry of the parents. It was not parent-inflicted injury or neglect because the chick was closely brooded and fed, and it did not present with any injury. A genetic incompatibility of the parents (for example, if they were siblings carrying genes for some genetic disease) would have probably resulted in early embryonic death or some detectable malformation or monstrosity of the chicks, so it did not seem a highly probable diagnosis. The only remaining possibilities were chronic infection with *E. coli* or *Sal-*

monella sp. These are gram-negative bacteria that are not natural guests of the digestive tract of birds (except for *E. coli* for raptors, perhaps⁶ *E. coli* is a non-pathogen guest of the mammal digestive tract, and *Salmonella* is a family of bacteria that cause typhoid and several forms of digestive diseases in humans and animals. Both these bacteria are common causes of late death in the shell⁷ Also, the description of the early death of chicks that hatch, caused by these organisms, fit very well with my case⁷. The problem was that we could not isolate any *Salmonella*, and the second culture of the parent birds

Photos by Ubaldo Lelli, M.D.



At day 38, the young Salvadori's Fig Parrot was beginning to show coloration. It was still being hand fed.



The nest box used to reproduce the Salvadori's Fig Parrot was a natural hollow log measuring about three feet in length, with an internal chamber approximately 6 to 6-1/2 inches in diameter. It was placed at a 45° angle within the cage and had a 3 to 3-1/2 inch entrance crack at the top.

was negative. However, in humans *Salmonella* can exist without causing disease in individuals called healthy carriers. The bacterium lives in the biliary tract, particularly the gallbladder, and this makes it extremely difficult to eradicate. Also, the bacterium is shed at unpredictable intervals, and can be very difficult to culture.⁸ This, taken together with the fact that tendency to bleed is a normal symptom present during the infection by certain strains of *Salmonella*,⁸ and many very virulent strains of this microorganism are endemic in southeastern Asia, led me to consider a covert infection by this bacterium of my birds as the possible

TABLE 1
Blood Chemistry and Cytology of Normal Salvadori's Fig Parrots

Test Name	Male	Female	Units
Total Protein	4.3	3.9	g / 100 mL
Glucose	292	365	mg / 100 mL
Calcium	9.5	9.7	mg / 100 mL
SGOT	318	295	IU / L
Lactate Dehydrogenase	307	365	IU / L
Creatinine	0.5	QNS	mg / 100 mL
Uric Acid	2.2	3.9	mg / 100 mL
Sodium	156	QNS	MEq / L
Potassium	4.0	QNS	mEq / L
PCV	50	46	
Total Heterophils & Eos	3,555	4,118	
Total WBC	4,232	4,733	
Diff H & E	84	87	
Lymph	16	13	

cause of breeding failure.

The treatment of the carrier status for *Salmonella* in humans is very difficult, because many antibiotics are inactivated or do not reach effective concentrations in the biliary tract to kill the bacteria. Therefore, long term treatments with ampicillin or thrimetoprim-sulfametoxazole are normally necessary to sterilize a *Salmonella* carrier.⁹ Traditional veterinarians will advise to destroy infected bird stock.⁷ Although I could not document this diagnosis, together with Dr. Kilgore we decided to intensively treat the birds for both *E. coli* and *Salmonella* anyway. After a ten day flock-type treatment (750 mg/

TABLE 2
Egg Characteristics and Breeding Schedule of Salvadori's Fig Parrots

Eggs:	White, 27 x 33 mm, laid at about 38 - 40 hours interval.
Incubation:	Female sits continuously for 24 days. The male feeds the female and she feeds the chicks. The hen bathes if air is dry (relative humidity less than 55%).
Clutch size:	Two
Note:	Parents sleep in nest box all year round. They copulate outside the nest box with a typical low-pitched vibrating call. Birds are continuous nesters with an interval of seven to ten weeks between clutches.

liter of ciprofloxacin in the drinking water;¹⁰ the birds went to nest again. This time the hen laid only one egg which failed to hatch, but was fertile. At this point, I took out the nest box and decided to go heavier on the treatment, and make sure that the birds absorbed the proper amount of medication. I was sure that, because of their watery, fruit-rich diet, my fig parrots had totally avoided drinking the strange tasting water.

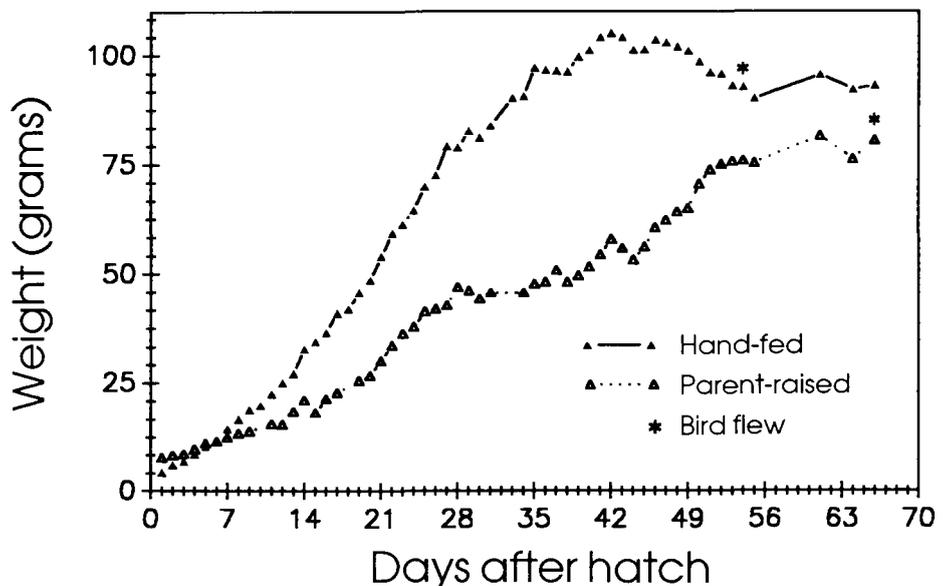
Thus the birds were treated with two injections a day of thrimetoprim-sulfametoxazole, for 14 days. This way I was sure that they would absorb the right amount of antibiotic. After the therapy, I let the birds rest for about a month, and then I put the nest box back. This time the hen laid two eggs which hatched on January 3, 1991. I took one chick for hand-feeding and left the other with the parents to compare the results. I

thought that in this way I would have the best chance to raise at least one of them successfully.

The first problem was to decide what formula to use. A diet for hand-rearing Desmarest's Fig Parrots has been published by Bill Lasarzig,⁵ but it contained ingredients that I could not obtain, and nectar, which my fig parrots have refused in any form. Two commercial brands of lory nectar were untouched both when served liquid, or when served with parrot pellets, mynah bird pellets, monkey chow, spongecake, bread or dogfood soaked in them. Therefore, I decided to design a hand-rearing diet for my parrots without preconceived ideas. For this, my research on the species' range, habitat, and biology became invaluable. If the fig parrots are similar to lorikeets, as suggested by certain authors,² then their formula should be similar to the one

Psittaculirostris Salvadori

(Hatched January 3, 1991)



used for lorries. On the other hand, if they are like other parrots who have a mixed fruit and seed diet, a basic parrot diet could be used, supplemented with fruit. If these birds, conversely, have to be considered close in their habits to softbills, then a high protein and fat diet should be used. I decided to go simple and take into consideration the parents' behavior in the choice of foods. I also chose a formula that has been successfully

used to raise both softbills and parrots, Nutri-start Baby Bird Food (Lafebre Company, Odell, IL). I have hand-fed many species of birds including grey parrots, lovebirds, finches, crows, mockingbirds, hawks and blue-jays on a variety of formulas. I have used Nutri-start successfully with lovebirds, mockingbirds, blue-jays and finches. This diet has the disadvantage of having to be cooked, but this makes it much easier to

digest for tiny chicks. It also contains highly digestible components, such as rice flour and egg. To it I added strained chick food in the proportions indicated in Table 3, according to the period of development of the chicks. I also added Nekton Tonic-K, in order to be sure the birds would absorb some amino acids even if they could not digest the proteins initially. The diet was diluted during the first week with Pedialyte, and calcium, vitamin K, A, D and zinc added as described in the table. The results were extraordinary, as documented by the comparison of the growth curves of the parent-raised versus the hand-fed chick. The parent-raised chick weighed nearly twice as much as its sibling at birth (7.7 g and 4.3 g for the parent-raised and the hand-fed, respectively), but the hand-fed chick rapidly grew to be twice as big as its brother (it weighed 34.4 g at two weeks, compared to 18.1 g of its sibling left with the parents).

The chicks were cultured on day 1, and they showed growth on McKonkey agar (for gram negatives), but subsequent cultures were sterile. However, as advised by Dr. Kilgore, I treated them with chloramphenicol succinate by mouth, twice a day (1 mg/10 g bird), for four days. The chicks were banded at day 11 (the hand-fed) and day 14 (the parent-raised) with a Society of Parrot Breeders and Exhibitors closed band of 1990 (I did not have 1991 bands) of 7/32" (cockatiel) size. A couple of days later, it would not have been possible to fit the bands on them.

Hand-raising the *salvadorii* chick was an unusual and interesting experience. I have discovered long ago that chicks differ considerably from one another, showing an individual personality very early. However, I never encountered chicks that behaved as strangely as these. My *salvadorii* chicks were little bundles of nerves. Compared to lovebirds, they were much more nervous and hyper!¹ This may be due to the high amounts of vitamins in their diet. Velma Hart suggests not using any vitamins during the first two weeks, because it makes the chicks hyper. However, especially after the feathers start to bloom out of the shafts, the chicks started to show some signs of intelligence. They recognized my mood, and were scared if I moved too fast. These chicks cry a lot, many times during the night. I have observed this both in the hand-

TABLE 3
Hand-feeding Diet and Schedules for
Salvadori's Fig Parrots

Base diet:	2 tablespoons Nutri-Start Baby Bird Food (Lafebre) 6 tablespoons cold water <i>Cook in double boiler or according to the instructions of the manufacturer.)</i> Add: 1 tablespoon Nekton Tonic-K 1/4 teaspoon Nekton Q
Diet A, days 1 - 3:	To the base diet above, add: 1/2 2-oz. jar of strained baby banana 1/2 2-oz. jar of strained baby carrot 1 tablespoon applesauce (all first or second foods)
Diet B, days 4 - 14:	To the base diet above, add: 1 tablespoon baby banana with tapioca 1 tablespoon baby creamed spinach 1 tablespoon baby carrot
Diet C, days 15 and thereafter:	To Diet B, add 1 teaspoon of creamy peanut butter when still warm, before the other ingredients are added.

Diets can be stored refrigerated for three days. The formula must be served at 100° to 105°F (check with thermometer). The leftover is discarded. Depending on thickness, Pedialyte can be used to dilute the diet.

Immediately before feeding, after reheating, additions of minerals and vitamins are made as indicated in the following Schedule.

Schedule:	Feedings 1 - 3: only Pedialyte is fed.
Days 1 - 3:	Diet A plus a sprinkle (1/3 of a 1/4 teaspoon added to one tablespoon of formula) of Prime every other feeding plus sprinkle of Nekton MSA and vitamin K* once daily.
Days 4 - 14:	Diet B plus a sprinkle of Prime every other feeding plus sprinkle of Nekton MSA and vitamin K* once daily.
Days 14 and thereafter:	Diet C plus Prime, Nekton MSA and vitamin K* once daily. Three drops cod liver oil and 1/4 teaspoon powdered cuttlefish bone every other day.

Chicks are kept at 90° - 95°F in a brooder with 50% humidity through their fifth week. They are fed every two hours night and day for the first three days. Then every two hours with a night pause between 1:00 a.m. and 5:00 a.m. Heat is progressively lowered and feeding made less frequent with development. After the third week, five feedings a day are given, and the night interval is from 12:00 a.m. to 6:00 a.m.

* 1 teaspoonful Nekton MSA is finely powdered in a mortar with one 100 mg vitamin K and one 50 microgram zinc tablet added.

fed and in the parent-raised chicks. They cry whether they have a full or an empty crop, whether there is noise, music, or quiet. The eyes start opening at day 8. The feather tracts appear at day 17, and the feathers start blooming out of the shaft at day 28. It seems that the chicks tend to bleed easily very early in their development, with pronounced improvement after the first week. My hand-fed chick bled profusely at day 3 after one of its down hairs was pulled out, due to its becoming pasted to the paper towel by its dried droppings. The chick also bled profusely when one of its toes was inadvertently injured removing solidified droppings. However, when the parent-raised chick injured its leg in the wire ladder inside the nest box at day 29, it bled only minimally.

The high requirements for vitamin K have been recognized early in this species? Scientifically, it is surprising to encounter a species that has a high requirement for this vitamin. Vitamin K is a very common substance, being present in all greenstuff and also in animal food. However, its most important source is from being manufactured in the bowel by bacteria. The reason why antibiotic treatment during quarantine, or at any other time, causes higher demand for this vitamin is the decrease in the bacteria in the gut. In human children, a syndrome of vitamin K deficiency is not uncommon. It can be corrected by injections of the vitamin. One of the peculiarities of this vitamin is its absorption. Vitamin K exists in several forms in nature. The vitamin from plants (vitamin K₁) is called phytonadione. Gram-positive bacteria manufacture menaquinone (vitamin K₂) in the gut by transforming phytonadione. Both vitamin K₁ and K₂ need the presence of bile salts to be absorbed from the gut. Therefore, an incompletely developed digestive system, a biliary tract not working properly, or a diet with insufficient fat can all cause a deficiency of vitamin K due to malabsorption. Vitamin K₃, the synthetic menadione, does not need bile salts to be absorbed and is called commercially Konakion (Roche). The consequence of these considerations is that a bird needs a proper population of bacteria in the gut to produce vitamin K. For this purpose, I used Prime (Rolf C. Hagen Co., Mansfield, MA) in my formula. This product contains three gram-positive bacteria that help establish a

good flora in the gut, in addition to calcium and other minerals.

The chicks became much calmer after feathering. They are confident, beautiful, little parrots that move by hopping around in a strange way. They weaned easily with ripe banana and spray millet. Their colors resemble that of their mother. I do not know the sex of my chicks yet. They are sweet, and they fly very skillfully, joining me during breakfast and any other time I let them out. They are very territorial and will attack any other bird perching on me or on their cage.

I hope this report will be of some help to aviculturists who are trying to establish a domestic population of fig parrots, and who are attempting to breed other species. Knowledge is the most important weapon that aviculturists have in the struggle against the extinction of species, which is happening now at a continuously increasing rate. I also hope that the work of "living-room" aviculturists such as myself will help convince radical conservationists that we also can contribute something towards the preservation of this planet and its beautiful life forms.

This breeding would not have been possible without the skilled, continuing advice of Dr. Alexandra Kilgore, Littleton Animal Hospital, Littleton, Massachusetts.

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