history and experience with strangers will greatly influence his desire to readily present this behavior. Outdated advice suggested passing the bird from person to person. Similar to forcing parrots to obey, this leads to a parrot who may comply but is not an eager participant. Instead we create a parrot who learns he has no choice in the matter or one that shows aggressive behavior or fear responses towards new people.

Positive reinforcement offers an effective pathway to creating a parrot that looks forward to interacting with strangers. Just like other behaviors discussed, we can focus on breaking this down into small steps or approximations.

To train this behavior it is best to have the new person stand still and hold their arm steady. The person with the bird reinforces the parrot for remaining calm as they approach the new person. Using the methods described for training a parrot to step down, the bird can be prompted to step onto the steady arm of the new person using the closed fist as a target. After several repetitions the new person can substitute his or her closed fist for the target and deliver the reinforcers. The next step is to allow the new person to approach the parrot when he is sitting on a perch and present an arm to cue step up. The previous experience of stepping on the arm and earning reinforcers will have taught the bird there is value in stepping up on the new person.

This process should be repeated with many different people so that the bird learns to generalize the behavior. This makes it more likely he will step up onto any new person who presents the cue for step up in a manner to which the bird is accustomed.

Training vs. Maintaining Good Behavior

Training a new behavior may take some time, but the investment is worth it. Plan on a few sessions to get a new behavior trained. Difficult behaviors will take more time. If you really need a behavior trained quickly, have frequent short training sessions. This may mean up to three sessions a day depending on your parrots interest in the reinforcer. Most parrots will participate in training sessions for five to 20 minutes on average.

To maintain behavior be sure to reinforce your bird every time you request behavior. You will no longer need to have daily training sessions to teach your parrot how to do the behavior. Instead you will reinforce your bird whenever he presents the behavior in your day to day interactions.

Once a behavior is solid, try offering a different reinforcer for each presentation of the behavior. This will help keep your bird motivated to present behavior. He never knows if he is going to get a head scratch, a toy or his favorite treat. If for any reason your parrot stops presenting the behavior, you can go back to your approximations and retrain it. Usually the behavior will get back on track very quickly.

Recall

More and more people are learning to live with flighted parrots. Flighted parrots have the ability to land on perches that are not easily accessed by people. Some caregivers find this lack of control unnerving. However others are discovering if you have trained your parrot to recall reliably, managing a flighted bird becomes easy.

Training a recall starts with a solid step up behavior. This means the parrot must know how to use its own body power to place itself on your hand. A parrot that has been trained through coercion to step up will have a difficult time understanding it needs to make the effort to come to the hand. This means using positive reinforcement to train step up is critical for recall.

The first approximation for training recall is cueing the bird to step up. In the next approximation the hand is presented slightly farther away from the bird so that he must stretch his legs to get to the hand. In the following step the hand is presented at a distance that will require the bird to reach with his beak and pull his body to the hand. In some cases the bird may flap in conjunction with the step. This can be heavily reinforced to communicate flapping is desired. The next presentation of the hand should be far enough away that the bird will need to hop to the hand to gain reinforcers. Over time the distance can be increased. You can fine tune this training by presenting your cue for your bird to fly to your hand when the bird looks very likely to fly to you. This will pair a quick response to the cue with the action. This will help create a solid recall.

If your bird is not flighted, recall is still a behavior worth training. Instead of asking your bird to fly to your hand, you will be asking him to walk towards your hand. Practice the behavior on a flat surface initially. Then add climbing to your hand as another type of recall. If your bird ever ends up in a tree you will find this behavior extremely helpful.

You Can Do It!

Well behaved parrots do exist. Parrot can learn to step up, step down, go back into the cage, step up on strangers and come to you when called. Spend a few training sessions getting these five important behaviors solid. You will find interacting with your parrot even more rewarding when he is cooperative and eager to respond to your requests. Most importantly you will enjoy a wonderful relationship with your parrot based on trust.

Barbara Heidenreich has been a professional animal trainer since 1990. Her company, Good Bird Inc., provides parrot training DVDs, books and workshops. She has been a featured speaker on six continents and has been published in nine languages. She is a former president of the International Association of Avian Trainers and Educators and served on the Board of Directors from 1997–2009. Barbara also consults on animal training in zoos.

AVIAN PROBIOTOCS

By Jeanne Smith, DVM

Probiotics have become increasingly popular in both the human and animal health supplement industries. What exactly is a probiotic? The currently accepted Food and Agriculture Organization/World Health Organization definition of a probiotic is "live microorganisms which when administered in adequate amounts confer a health benefit on the host." For many years, "beneficial bacteria" products have been available labeled as nutritional supplements. The big differences between a nutritional supplement and a probiotic is that the bacteria in the nutritional supplement doesn't have to be alive and there is no implied claim it will have any health benefits.

Until recently the Food and Drug Administration required products labeled as probiotics to be FDA approved or indexed because the definition (and public perception) of a probiotic meets the FDA's definition of a drug: "articles intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease" and "articles (other than food) intended to affect the structure or any function of the body of man or other animals" (Food, Drug, & Cosmetic Act, section 201 (g)(1). Now the FDA has relaxed its regulations on probiotics, allowing them to be labeled as probiotics with approval only necessary if any efficacy claims are made on the label. Now that FDA has changed its regulations, many products labeled as avian probiotics are being put on the market. It's important to know more about avian probiotics to wisely choose among these new products.

Avian Normal Bacteria

Back in the 1950s researchers determined that various species of Lactobacilli and anaerobic coccoid bacteria were the main normal bacteria in chickens and turkeys. In the late 1970's researchers began investigating the normal bacterial flora of pet birds. Most papers reported predominantly gram positive bacterial flora, and, as in poultry, most frequently various species of Lactobacilli and gram positive cocci. Gram negative bacteria were determined to be abnormal and potentially harmful to pet birds. One study examined the numbers of different bacteria in various healthy pet birds of different ages. They found that young birds had the highest numbers of normal bacteria and as birds aged they had fewer and fewer normal bacteria. At the same time, younger birds had fewer gram negative bacteria and older birds had more.

Other factors besides age can affect a bird's normal bacterial flora. Stress has been found to decrease numbers of normal bacteria in humans, animals, and poultry. The same research has not yet been done in pet birds, but they have systems similar to poultry so we would expect that they respond much the same way to stress. Antibiotic treatment not only gets rid of abnormal or pathogenic bacteria but normal bacteria as well. That's why you'll hear of birds getting yeast infections in their intestinal tract after treatment with tetracyclines. The yeast isn't being held in check by normal bacteria anymore.

Parent birds dose their chicks with their normal bacteria when they feed them. If the parents are older, have been stressed, or have been treated with antibiotics they may not have the normal bacteria they need to pass on to their chicks. Handfed chicks don't get their parents' normal bacteria. This can be one reason why handfed chicks have more problems with gram negative bacterial infections and yeast infections than parent raised chicks do.

A good probiotic helps a bird by becoming its normal bacterial flora and supporting the growth of other normal bacteria. When it does this it strengthens all the natural defenses a normal bacterial flora provides.

Desirable Characteristics of an Avian Probiotic

Most of the research in avian probiotics has been done in poultry. Only a few studies have used pet bird species. The following information, therefore, comes primarily from poultry. The pet bird information is included where appropriate.

After decades of research, the following list of characteristics of an ideal avian probiotic has been proposed:

- Ability to adhere to intestinal lining cells
- Species specific
- Ability to colonize and reproduce in the bird
- Ability to survive throughout the GI tract
- Produce materials that harm pathogenic bacteria
- Ability to improve immunity
- Safe—doesn't cause illness
- Survive processing and storage

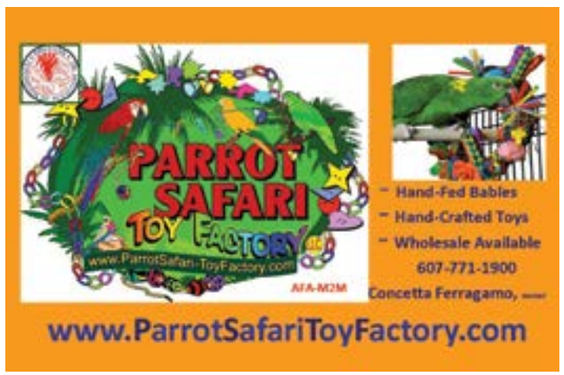
ABILITY TO ADHERE: Adherence means that the bacteria attaches itself to the intestinal lining cells. Even if the intestine is rinsed off well the bacteria stay attached. Researchers became aware of the importance of adherence through a series of papers published in the 1970s by a man named Fuller. All the avian species he examined—chickens, turkeys, quail, ducks, pheasants, and pigeons—had *Lactobacillus* species which adhered to crop cells. *Lactobacillus* species isolated from ten different mammalian species did not. Also, the other bacteria he

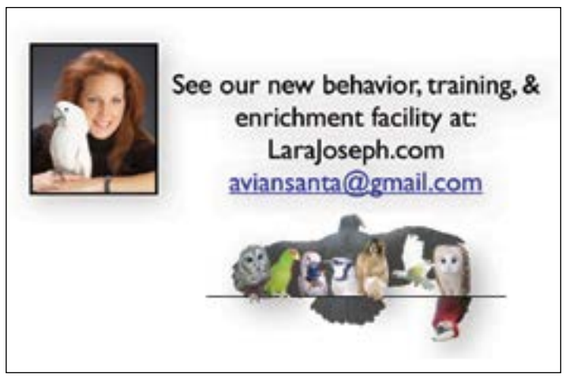
isolated from birds did not adhere to cells, only *Lactobacillus* species did. Giving Lactobacilli from mammals to chickens had no effect, but giving adherent Lactobacilli from chickens resulted in better growth rates and resistance to gram negative bacterial infections. Since the discovery of adherence in avian lactobacilli, researchers continued to find that mammalian Lactobacilli have no effect in birds and avian strains of Lactobacilli with a high level of adherence provide the most health benefits. In psittacines, cockatiel chicks were given a *Lactobacillus* species found adhered to crop cells from healthy adult cockatiels. The group not given the adherent Lactobacilli developed a population of non-adherent Lactobacilli by two weeks of age(presumed to be from the environment). The groups given the adherent Lactobacilli had significantly faster growth rates, 100 times fewer gram negative bacteria, and higher total numbers of lactobacilli. So the non-adherent Lactobacilli didn't provide the benefits seen with an adherent Lactobacilli.

Researchers believe that birds need adherent bacteria so that when the crop empties there are still bacteria available to inoculate new food entering the crop and to provide a constant supply of bacteria for the entire intestinal tract. Adherent bacteria help prevent pathogenic bacterial infections by competing for binding sites. The pathogenic bacteria need to attach to the intestines before they invade or just to keep from being swept away by the movement of the intestinal contents. If all the binding sites are already occupied, they can't do as much damage. Research has also shown that when a *Lactobacillus* attaches itself to an intestinal lining cell, it triggers changes in the cells themselves that improves immunity, improves digestion and absorption of nutrients, and helps keep pathogenic bacteria from attaching.

SPECIES SPECIFIC: What does species specific mean? The probiotic bacteria must be isolated from the same species of animal you'll be using it in. Our commonly kept pet birds belong to hundreds of different species. Blue and Gold macaws belong to a different species than Scarlet macaws. Umbrella cockatoos are a different species than Moluccan cockatoos, etc. No one knows how species specific a probiotic organism needs to be among closely related bird species. Even in poultry, most of the probiotic research has studied chicken-derived bacteria given to chickens. There are only a handful of studies of turkeys given a chicken-derived bacteria. Some report benefit and others do not.

The following research has been done in psittacines: Quaker parakeets were given a mammalian *Lactobacillus*probiotic for 3 days. No difference was found between the flora of the birds getting the probiotic and the birds getting no probiotic, but no live bacteria were found in the product used. A chicken-derived probiotic was given to various species of psittacine chicks throughout their handfeeding period. No changes in growth rate, bacterial flora, or resistance to disease was found. Again, no live Lactobacilli were ever cultured from the probiotic given. In cockatiel chicks, a chicken-derived *Lactobacillus* nutritional supplement was given from 14-42 days of age. This time live Lactobacilli were found in the product. The chicks showed significantly increased growth rates but no reduction in numbers of gram negative bacteria or yeast. Cockatiel chicks given an adherent cockatiel-derived *Lactobacillus* from hatch to six weeks of age showed significantly increased growth rates, reduced levels of gram negative bacteria, and increased total numbers of lactobacilli. Lastly, a Lactobacilli-based probiotic was given to three species of macaws (Spix, Lear's, and Hyacinth) but what species of bird the Lactobacilli came from was not reported. The birds showed a shift from mostly gram positive cocci flora back to mostly gram positive rod flora based on gram stains of the droppings. From this very limited amount of psittacine research it appears that there might be a few take-home messages emerging: the beneficial effects of a probiotic depends on the presence of live organisms; some cross-species benefits do occur; and more dramatic benefits may be seen when using adherent or species specific bacteria.





ABILITY TO COLONIZE AND REPRODUCE: Successful probiotic organisms colonize and reproduce in the bird. You should be able to find live probiotic organisms in the bird after you stop giving the probiotic. That means it has established itself in the bird's intestinal tract.

ABILITY TO SURVIVE THROUGHOUT THE GI TRACT: In order to populate the entire intestinal tract, a probiotic organism must be able to survive the acid environment of the proventriculus and gizzard and survive in the presence of bile in the intestinal contents. Crop lining cells constantly die and become replaced with new cells. The dead cells travel down the intestinal tract with their Lactobacilli attached. Those Lactobacilli that survive passage into the intestines are able to provide their beneficial effects there as well. Potential probiotic organisms can be screened for their ability to survive in acid and bile or by finding live bacteria in the droppings or vent swabs.

PRODUCE MATERIALS THAT HARM PATHOGENIC BACTERIA: Since the 1970's researchers believed that competition for binding sites was only one way probiotic organisms inhibit pathogenic organisms. At first they thought the Lactobacilli inhibited other organisms by producing lactic acid which made the intestinal contents more acidic. Later they found that an acid environment or lactic acid alone could not explain the inhibition that was seen.

Other inhibitory materials, or metabolites, were discovered. Different Lactobacilli vary in the types and amounts of metabolites they produce. One study tested inhibition of *E. coli* and *Salmonella enteriditis*, by metabolites from 296 different strains of Lactobacilli isolated from the intestinal tracts of chickens. They found 77 strains produced inhibitory metabolites against one or both of the pathogens and 35 of those 77 showed strong inhibition against both bacteria.

ABILITY TO IMPROVE IMMUNITY: Much more research into probiotic effects on immunity has been done in humans and mammals than in birds, but some work has been done in poultry. Probiotics have been found to improve immune function and influence changes in the intestines that improve disease resistance. In chickens given Lactobacilli then given coccidia (an intestinal parasite), numbers of the parasite found in the droppings were reduced by as much as 75%, while certain types of immune cells and cell products that stimulate the immune system were significantly increased. Several studies in chickens have shown that probiotics can significantly increase antibody production, improve response to vaccination, and increase intestinal immunity.

SAFE: All probiotics in use today can be found on a list of generally regarded as safe (GRAS) bacteria. Probiotic bacteria must be shown to be harmless to birds.

SURVIVE PROCESSING AND STORAGE: To be marketable, a probiotic organism must grow well in artificial media and then survive freeze drying, storage, and reconstitution. Because the beneficial effects of a probiotic requires that the bird takes in enough live organisms, the organisms must be able to survive whatever they are exposed to until they are ingested. Probiotics need to be viability tested for shelf life, storage conditions, and administration conditions.

Probiotic Benefits Documented in Birds

DISEASE PREVENTION: Many studies in poultry have shown probiotics can prevent disease and reduce the numbers of pathogenic organisms they shed into the environment. Most of these studies involved pre-treatment with probiotics either before or at the same time the pathogen was given. In a comparison of probiotic pre-treatment and treatment (given probiotic after giving the pathogen) pre-treated birds showed much better survival and performance, although treatment provided some protection as well. In psittacines, a species specific *Lactobacillus* given to cockatiels showed a significant reduction in potentially harmful gram negative bacteria. Several of the characteristics of a good probiotic organisms combine to help prevent disease.

GROWTH PROMOTION: Improved growth rates are seen in chickens, turkeys, and cockatiels given probiotics. Decreasing the number of pathogenic organisms a bird has to cope with can certainly help them grow faster, but there are other mechanisms in play. Studies have shown that probiotics in poultry reduce the numbers of bacteria that produce ammonia in the intestinal tract. Ammonia damages the intestinal cells, making them less effective at absorbing nutrients. When less ammonia is produced, growth rates increase. Probiotics have also been found to increase the amount of digestive enzymes produced by chickens and they trigger physical changes in the intestine that increases the amount of absorptive surface available.

The overall effect is to make more nutrients available to the bird from its intestinal tract.

Multiple- vs. Single-Species Probiotics

Some probiotics contain several different species of bacteria and some contain just one, usually a *Lactobacillus*species. Some researchers believe that the best overall benefit can be obtained when different types of bacteria each play their own role in protecting the bird. Other researchers have developed methods to screen Lactobacilli for positive traits and believe that if you use a very good strain of *Lactobacillus*you get the best results. There are many studies that support each of the two opinions. Currently

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multiple species probiotics most frequently have some combination of Lactobacilli (often a few different species or strains), *Streptococcus* species, *Bifidobacterium* species, *Enterococcus* species, and *Bacillus* species.

Recommendations for Probiotic Use

Appropriate probiotic administration can both prevent gastrointestinal diseases and help a bird fight off existing infections. Prevention is much more effective and probiotics should not be used instead of specific treatments for an intestinal disease. You should continue to get a sick bird diagnosed and treated, using the probiotic as additional help. In the poultry industry, probiotics are recommended for treating newly hatched chicks who have no contact with older birds. This allows them to establish a healthy intestinal flora and help them develop their intestinal immune defenses. In psittacines, parent birds feeding chicks in the nest provide normal flora as they feed their chicks. The parents might need to be given a probiotic if they are older birds, have been treated with antibiotics, or have been through a stressful period. Handfed chicks do not receive normal flora from their parents, so giving a probiotic would serve the same purpose as it does in poultry chicks separated from adults.

Because numbers of gram negative bacteria increased with age and numbers of Lactobacilli decreased with age in psittacines, periodic treatment with a probiotic to replenish their normal bacterial flora would be advisable, especially in pet birds with limited exposure to other members of their species.

As mentioned earlier, antibiotic treatment is known to kill normal flora in addition to the target pathogenic bacteria. Probiotic use may be indicated after antibiotic treatment to re-establish normal flora. It's probably not advisable to give a probiotic during antibiotic treatment because the antibiotic will likely just kill the bacteria you're giving the bird. Wait until the antibiotic treatment is finished before starting the probiotic.

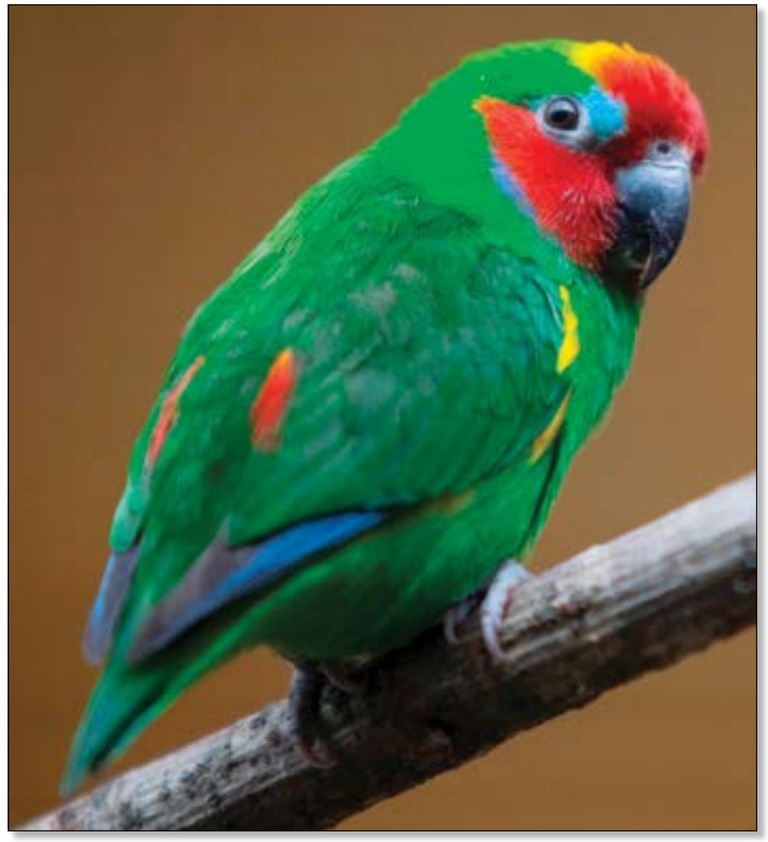
Birds experience stress when something significant changes in their environment or if they are subjected to uncomfortable or fearful conditions. Things like moving, getting a new puppy or cat in the household, being set up with a new mate, having an owner be less available are all examples of potentially stressful situations for a bird. Studies have shown that physiologic stress reduces numbers of normal bacteria and increases numbers of abnormal or pathogenic organisms in the intestinal tract. Stress also triggers changes that decrease intestinal immunity and overall immunity and damages the intestinal lining. Because probiotics help stimulate immunity and help intestinal cells heal, they should be used in times of stress to help prevent disease.

Summary

There is ample evidence that the use of appropriate probiotic organisms can provide significant benefits to birds. More research is needed to determine if bacterial strains can be found that adhere or colonize in multiple pet bird species. Because the commonly kept pet birds belong to hundreds of different species, it won't be possible to develop species specific probiotics for them all. Research has shown that even among Lactobacilli there's a wide range of abilities to adhere, produce inhibitory metabolites, and survive passage through the intestinal tract.

Potential probiotic bacteria need to be screened and selected for positive traits. Probiotic manufacturers need to determine the minimum doses of live organisms needed and be able to guarantee delivery of that minimum dose under recommended storage and handling conditions.

Breeding Fig-parrots in Weltvogelpark Walsrode



With a maximum size of 20 cm, fig-parrots *(Tribe Cyclopsittacini)* are among the smaller species within the Order Psittaciformes.

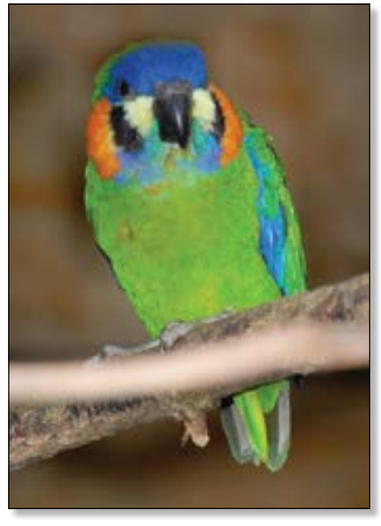
Weltvogelpark Walsrode houses four of the five known species of these small parrots (Genus *Cyclopsitta* and *Psittaculirostris*). During the 2012 breeding season the Orange-breasted Fig-parrots *(Cyclopsitta gulielmitertii)* as well as the Double-eyed Fig-parrots *(Cyclopsitta diophthalma)* successfully parent-reared their young. Germany-wide, both species can only be seen in Weltvogelpark Walsrode.

All the seven recognized subspecies of the Orange-breasted Fig-parrot inhabit rain, monsoon and swamp forest in lowlands and hilly regions up to 1100 m on New Guinea and surrounding islands. In the wild the main breeding season is between December and June. These fig-parrots nest in a hole that they excavate themselves in an arboreal termitarium. In contrast, the Double-eyed Fig-parrots nest in existing cavities in a hollow of a high tree or in a rotten tree trunk or limb. This species has eight recognized subspecies which are found on New Guinea and on the Northeast coast of Australia. Double-eyed Fig-parrots inhabit lowland and montane forest, mangroves and more open woodland up to 2000 m. The main breeding season occurs between March and June in New Guinea, while in Australia the birds mainly breed between August and November.

A special feature, alluded to in their name, is the diet of these small parrots—in the wild they mainly feed on fruits of various fig trees, preferring the seeds rather than the flesh of the figs. Additionally, a variety of other fruits and berries, nectar and also insects and their larvae are taken.

In captivity experiences have shown that fig-parrots are very sensitive to disturbance, especially during the breeding season. Changes in their direct surroundings as well as at the nest box can unsettle them. It is very important to deal with the birds very carefully in order to breed them successfully.

To encourage our breeding pairs of Orange-breasted Fig-parrots to start breeding, we construct nest boxes with a size of 30 cm x 20 cm x 20 cm (length x width x height) that are placed in the enclosures behind the scenes. These nest boxes are made of waterproof particle board. An entrance hole with a diameter of 4 to 6 cm is provided on both sides of the boxes. The boxes are entirely filled with natural cork tiles. The cork is scratched a bit at the entrance hole to provide the birds with a starting point to begin excavating their nest cavity in the cork tiles. Digging the cavity together stimulates the pair's breeding instinct. Once the nest cavity



At top, a male Double-eyed Fig-parrot at Weltvogelpark Walsrode. Above, a female Orange-breasted Fig-parrot at the park.