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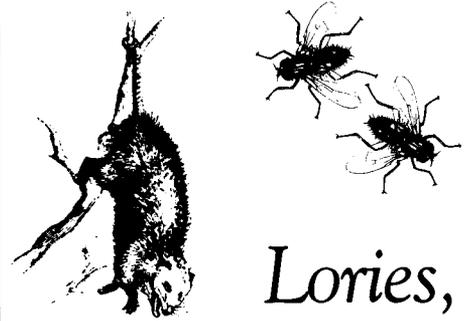
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The Deadly Sarcosporidiosis

*by Phyllis K. Martin
Tampa, Florida*

I should have known things were going too smoothly. Due to the rather warm fall and winter season here in south Florida, most of my birds were busy pairing off, preparing nests, and laying eggs just prior to Christmas. My husband and I were busy building new nest boxes and tearing down old flight cages to replace them with newer models, and then disaster struck.

We were warned that our very hot temperature of 85 to 90 degrees was dropping to the lower 40s on December 10th. We got busy securing cage tops and checking nest boxes, adding shavings were needed to help insulate eggs and females heavy with eggs. Feeling confident that our birds had survived even lower temperatures, we went to bed secure in the belief that things would weather through this cold snap.

Early the next morning, while feeding nectar to the lories, I saw my prize male Meyer's Lorikeet sitting with his beak hooked at the opening of his nest box with his mate chattering excitedly just outside. I placed tubes of nectar on the cage and when the male Meyer's did not come out of the box I knew something was wrong. I removed him from the cage to discover he was ice cold to the touch with his feet drawn up with no strength to even attempt to bite. I held him next to my body to warm him while I set up a heated hospital cage. I fed him a small amount of very warm nectar and then placed him in the hospital cage while I resumed feeding the other lories outside.

When I returned outdoors, I noticed the female Meyer's looked a little distressed. The male and female had been actively feeding each other for several days so I thought she may be producing an egg and the cold was affecting her. I took her indoors to another hospital cage. I took another look at the other lorries and lorikeets just to be sure no one else was in trouble and all appeared to be okay. In fact, my oldest pair of Meyer's Lorikeets were sitting tight on two eggs.

I could not understand why the two Meyer's Lorikeets I just pulled were in trouble because they were in with five other young Meyer's Lorikeets and they were not showing any signs of distress. All seven of the Meyer's Lorikeets were captive-bred birds ranging from two to three years of age.

I checked on the two stressed Meyer's Lorikeets hourly and the male was rapidly going down hill. Two hours after pulling him, he started having convulsions, throwing his head back, quivering his wings and clamping his feet. I knew he would not live but kept praying by some miracle he would pull through. However, he was found dead four hours later. The distressed female Meyer's would not eat so I tried feeding her from a spoon. She took a few small laps of nectar but then retreated to the back of the cage and huddled in the corner. Later that night, I physically examined the female lorikeet to discover that her crop was full of clear mucus. Upon checking her food dish, I could not tell if she had eaten any of the nectar.

The female lorikeet's crop emptied during the night but I could not entice her to eat anything on her own. She would just sit in the corner, staring off into space. On Tuesday morning, I found the female Meyer's dead. My husband and I discussed taking the bird to the veterinarian for a necropsy but figured the hen death during the night in the heated environment would negatively affect the report. The same circumstances applied to the male which had died the previous Sunday morning. We figured that whatever the male had he must have passed it to the female while feeding her.

On Wednesday, we found our naked female Edward's Lorikeet dead in the box and assumed she died from the cold and possibly old age. We again checked the lory collection

closely to see if we could spot any problems and everyone appeared to be acting normally. However, on Thursday morning we found one of our oldest male Green-naped Lorikeets dead in the cage with no apparent injuries. On Monday, the 19th of December, we found our last Musschenbroek's Lorikeet dead with no prior symptoms of being ill.

We started thinking the worst. Could it have been food related or weather related since we had such tremendous weather fluctuations? We could not get the birds' bodies to the veterinarian quickly as he is located an hour's drive away. We started reviewing everything we were doing in preparing food and feeding the birds when it dawned on me that we were probably giving our birds salmonella.

We rehabilitate native wildlife and had recently received injured redbill hawks which we fed raw chicken parts. I had just recently seen a television program where they showed someone preparing a complete dinner and talked about which items would be carrying salmonella. The chicken prepared for the dinner was the original culprit, however, it was stated the salmonella bacteria could be killed by cooking the chicken, but the salmonella was also rapidly spreading through the tossed green salad which included hard boiled eggs. The show stated the reason the salad had the bacteria was that the person preparing the dinner used a wooden cutting board while cutting up the chicken. The board was rinsed under running water prior to chopping up the lettuce and other vegetables, thereby allowing the salmonella bacteria to come in contact with the salad items. Sterilizing wooden cut-

ting boards is almost impossible due to the wood's porous structure. The show recommended using plastic-type cutting boards for cutting up meats. This related to our particular procedure in preparing food because we have a large, wooden table top on which we prepare all of the food, especially the fruits and vegetables fed to all of our birds.

We decided that if any other birds died we would have them checked. Needless to say, on December 28th we lost a female Red-flanked Lorikeet which has been housed inside, unlike the other birds which were housed outside. I called the veterinarian and talked with him expressing my concern about the bird deaths, explaining why I thought salmonella was the culprit. He stated this could very well be the case but that if I lost any more birds to bring them in for necropsy.

On Friday evening, I found a female Stella's and a male Foresten's Lory dead. I placed the birds in the refrigerator, hoping to catch the veterinarian in his office on Saturday morning. Saturday morning arrived with another death, this time a male Fairy Lorikeet. Since it was New Year's weekend, I was unable to get birds to the veterinarian's office; however, on January 2nd I made an appointment to take some birds in for fecal workup to see if they were carrying salmonella bacteria.

While waiting for the test results, things seemed to slow down without any bird deaths for several days. But hope turned to despair on January 14th when I found a male Stella's dead. (Have you ever noticed that birds either die during the night or on the weekends when it is difficult to get veterinary help?)

Several days passed and I was anxi-



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ously awaiting the results from the lab. During this wait, I checked and double checked the birds daily, trying to find some common factor between the deaths. On January 16th, while checking the birds, I found a Goldie's Lorikeet hanging on the side of the cage with the top of his head chewed open. The other five Goldie's were picking on him so I assumed they had pecked open the skin on his head. I removed him and gave him first aid treatment. After placing him in a hospital cage, I noticed he was unsteady on his feet and figured he was stressed from the trauma. This Goldie's Lorikeet died during the night. The remaining five Goldie's appeared to be okay but I watched them closely for any signs of disease.

Again, things appeared to stabilize and we had no other deaths until January 28th when I found a male Black-capped Lory dead. I had noticed him sitting in the corner of the cage the day before, staring into space and not responding to voice stimuli but when I placed food into the cage he moved to the dish for food. I did not notice any other symptoms with the Black-capped Lory and assumed things were okay. How wrong I was!

On February 2nd, I found a second Goldie's Lorikeet in the indoor cage having difficulty standing. He appeared to be very disoriented and unsteady on his feet. His movements were jerky. The other four birds were chasing him around the cage so I moved him into a smaller holding cage. This Goldie's Lorikeet continued to eat on his own but progressively showed increased signs of nervousness. By the fourth day I had to hand feed him because he was unable to hold his head steady enough to feed from his nectar dish. The only way he could stay fairly stable was to wrap his feet around the cage bars.

During this time, he would preen himself and chirp to the other Goldie's.

On the fourth of February, I noticed a Perfect Lory housed outside with his mate showing signs of nervousness and he was very unsteady on his feet, moving with great difficulty from cage floor to perch. He held his head at a slight angle, and he appeared to stare into space. Before placing him into a hospital cage, I checked his eye movement with a penlight and he responded to the stimuli. It is difficult to explain, but the bird appeared to stare into space

and was slow to respond to noise and I felt this was an important clue as to the cause of the disease outbreak. I researched the symptoms in the "Clinical Avian Medicine and Surgery" by Harrison and Harrison only to find out that there are many diseases and nutritional unbalances which can cause the neurologic signs of ataxia, disorientation and seizures.

I took the second Goldie's and the Perfect to the veterinarian's office on February 6th for evaluation. While I was there, the lab reports were delivered regarding the suspected salmonella. All reports were negative. After viewing the two lorries, the veterinarian stated we were probably dealing with a virus, possibly encephalitis, and we could only verify this disease if we obtained tissues from the brain within one hour after death. He stated there was not much to do for this as it had already attacked the nerve center in the brain, but he placed the birds on injectable Chloramphenicol for secondary infections.

The birds did not improve and the Perfect died on February 13th. On February 15th, I found a Dusky Lory showing signs of unsteadiness and having difficulty walking across the wire floor of the cage. This walk is similar to a bird having difficulty walking across a wire surface with extra long toenails. In desperation, I called a veterinary school in Gainesville informing them I suspected a viral outbreak in my aviaries. I informed them I had a bird with advanced neurologic signs and another just showing signs. We delivered the birds to the school and they performed euthanasia on the Goldie's Lorikeet so we could get clinical lab results. They agreed to hold off euthanasia on the Dusky Lory until the bird either showed increased signs of the disease or died.

The lab findings reported *sarcosporidiosis*. The clinical signs of the brain were: The cerebellum diffusely infiltrated by lymphocytes, plasma cells and macrophages, and moderate numbers of lymphocytes and plasma cells occur in the meninges and perivascularly in the neuropil. A marked loss of cerebellar architecture. The molecular layer pale, extensively vacuolated and infiltrated by leukocytes. The granular layer less dense than expected, and vessels numerous and prominent and often cuffed by leukocytes. There were numerous protozoal cysts present which were 20 to 60 um diameter containing

basophilic, 1 to 3 um organisms that were circular or crescent and were loosely or densely packed in the cyst. Occasionally, organisms radiated outward around a central homogeneous area.

According to Dr. Susan Clubb's article, "An Acute Fatal Illness in Old World Psittacine Birds Associated with *Sarcocystis Falcatula* of Opossums," sarcocystis are coccidia which have an obligatory two-host life cycle, alternating between predator and prey hosts. The predator, opossums, serve as the definitive host. The prey, grackles or cowbirds, serve as the intermediate hosts. Flies and cockroaches can mechanically transport sarcocystis by consuming feces of the opossums and then feeding in the birds' food dishes. According to Dr. Clubb's article, the heaviest losses from sarcocystis occur usually in the winter, especially in February.

As you can see from the above detailed events, we made several mistakes in assuming possible reasons for death. All of our birds outdoors are housed in 1/2" x 1" cages suspended 36" from the ground so we figured the risks of parasite and bacteria invasions would be low. However, many of the findings mentioned in Dr. Clubb's article have held true for our bird losses. During December and January, we have been overrun by flies feeding on the food particles dropped to the ground by the birds. We live in a residential neighborhood with no wooded areas close by, but we have been trapping opossums in the yard, catching an average of two a month for the past three months. We also have visiting grackles, mockingbirds, and doves feeding on dropped food.

Due to the heavy fly infestation, I periodically spray the ground underneath the bird cages and have a pest control company bait for cockroaches. However, the flies have been nearly impossible to get rid of and I have noticed they feed on the nectar and the soft food of the lorries. So, in my case, I believe the flies have been the carriers of sarcocystis infection from the opossum feces to the birds which has left me, and my birds, devastated.

We are redoing the outside lory and lorikeet cages, enclosing them within a specific area, covering the structure surrounding the cages with fine mesh shade cloth or mosquito netting in order to reduce the risk of sarcocystis in these aviaries. ●